The Chemical Age

A Weekly Journal Devoted to Industrial & Engineering Chemistry

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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Other communications relating to advertisements or general matters should be addressed to the Manager.

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Chemical and Dyestuffs Traders

WE dealt some time ago in these columns with the question of the organisation of British chemical traders, and suggested the need of one central and representative body which should be accepted by the whole industry. We understand that for some time past negotiations have been proceeding among a number of British firms, and that on Wednesday, in the Board Room of the Manchester Chamber of Commerce, "a well attended meeting of leading and representative British chemical and dyestuff traders was held with a view to the formation of a Chemical and Dyestuff Traders' Association." After discussion the meeting resolved "that the necessary steps be taken to that end." No doubt more will be made known shortly respecting the proposed new organisation, and for the moment nothing further need be said.

British Chemists on German Industry

THE British experts in chemical industry who visited the occupied regions of Germany some nine months ago have now made known their report which, though it contains little which is substantially new in principle, certainly makes most interesting reading. As it is, the report we feel sure will not be very widely circulated, for we understand it is priced at ten guineas, and from this standpoint it will scarcely appeal to the individual chemist. We give elsewhere a short summary of the main features of the report; but we think it may be said in general that the opinions expressed coincide with the impressions which we published last week of a British chemical manufacturer who had only just returned from Germany, and who carried the story up to a later period than that covered by the report. The official inquiry was conducted in May and June of last year, the time spent in the occupied area being about a fortnight, and for convenience the Mission split up into four sections representative of four fundamental branches of chemical industry. The general impressions to be gathered are that in German works not only are the laws of chemical science applied to manufacturing processes, but what is far more important, scientific method is found to underlie all that appertains to industry. Moreover, scientific conduct is obvious in every branch of business activity whether it be in accountancy, in buying and selling, or in the management of labour. In fact, the German appears to have solved the problem of combining science with a business capacity—if not within one brain, certainly in the administrative machine taken as a whole. For instance, in many establishments success has been achieved by means of the complete and efficient combination of the services of a host of experts, each representing one of the main branches of activity. The Germans, we are told, have learnt how to use their leaders with the utmost effect, and from the national standpoint the welfare of the chemical industry is looked upon as a point of honour.

Again, it is instructive to note the recognised *liason* between engineer and chemist. The closest possible co-operation between the two branches is encouraged with the result that the two work hand-in-hand in full sympathy and with a mutual understanding of the object to be gained. This most surely is an example from which both British engineers and British chemists might profit; for as yet we do not seem to have succeeded in producing the ideal combination, and so long as the chemical and engineering sciences continue to remain as involved as they are it is almost impossible to expect any single individual to arrive at a stage of omniscience. A close comradeship between the two branches is the probable solution, but such sympathy was incapable of development so long as the engineer

was content blindly to regard his essential brother in industry as merely one who indulged in " the indelicate pastime of making stinks." Fortunately, the war was instrumental in putting the chemist in better odour in the engineer's opinion, and it is to be trusted that the budding comradeship has arisen from a sense of duty rather than a sense of profit.

It would be particularly interesting at the moment to have a frank opinion from the German industrialists as to how they view the attacks which are now being made on their former monopolies. So far statements on the subject of capturing Germany's chemical trade have been almost exclusively one-sided, and it is only by reading between the lines that one is able to trace out their own feelings in the matter. That in their hearts they are not comfortable about things may be gathered from the obstacles which have been put in the way of Allied chemists visiting their works, as an example of which may be cited the assumed ignorance, the " manœuvering " of such things as gauges and thermometers, and the removal of access ladders. On the surface, of course, there is an attitude of artificial indifference, outside plans for competition being regarded as mere " stunts "—and, perhaps, this pose is all the more illuminating because it is an open confession of what in flying parlance is called " getting the wind up."

The Control of Research

WHEN in the early days of the war the Government, alive at last to the call of science, organised the Department of Scientific and Industrial Research, all but a few long-sighted cynics welcomed the new era of scientific advancement. In connection with this Department, industries have been invited to form Industrial Research Associations, and several such Associations have been well established and are working on sound lines. But all, it is to be feared, are not of this class. Some seem to have failed to realise that public funds are voted not in order to subsidize a given industry but in order to encourage scientific advancement in industry generally; they have so organised their staff and laboratories that they have become little better than cheap analysis shops, to which the thousand and one petty troubles of the associated firms are sent. There is little hope for the future in such industries if they persist in a policy which will drive out the consulting chemist, from whom so many of the advances have emanated; which, moreover, so swamp the laboratories with routine work that, even if they be willing, the chemists cannot attend to serious research. These industries will undoubtedly go to countries where research is treated with greater respect.

In at least one association the pendulum has swung so far from the early ideals that it is difficult to understand why any reference at all need have been made in the articles of association to " research." Dr. Morris Travers has performed a public duty by bringing some facts to light in a communication to *Nature* (quoted elsewhere). The Glass Research Association has appointed as its director of research Mr. Frink, an American subject. To put the matter mildly, this might easily be mistaken for a slight on those devoted British chemists who in five years have carried through the scientific work which has conduced to the building up of one of the most successful key industries. In ordinary circumstances appointments in these Associations would be held by British men of science, and apparently the Department concurs with this view, since one of the conditions of grant states :—

> (7) The Department acting in the national interest may,—
> . . . . (*b*) prohibit the communication of any results to any foreign person or body or to any person or body under foreign control as defined in the Model Articles of Association.

This provision makes it all the more difficult to understand the present appointment. It is noteworthy that in the list of licensed and approved Associations, every body, save one other, is referred to as a " British " Association, *e.g.*, the British Photographic Research Association, whereas the body making the appointment referred to is simply the Glass Research Association. We prefer not to discuss here the qualifications of the gentleman appointed, though very little appears to be known of his scientific work.

Soaring Tin Prices

THE rise in the cost of tin is certainly remarkable, and, although prices have been marking time for the past three weeks, there is every indication that they have by no means reached a maximum. At the present time English ingots are fetching about £385 per ton, whereas three months ago the price was over £100 per ton lower. Presuming that the present value will be maintained for some time to come the situation lends itself to interesting speculation in two directions. Primarily, there is the question of the home-produced metal, the industry connected with which is mainly centred in Cornwall, where some 5,000 to 6,000 tons are annually turned out. This is not a large production, for it amounts to only some 5 per cent. of the world's total output; but more important is the fact that commercial prosperity has seldom favoured the home industry. It is interesting to note, however, that the value of tin nearly trebled during the period from 1896 to 1906, and to-day the price stands not very far short of three times that ruling in 1906. It would appear, therefore, that if the English industry is capable of thriving it should certainly find its opportunity now. Incidentally, it is encouraging to hear that the failure of the home industry to prosper is under consideration by a committee of experts.

The second direction in which current prices should prompt a good deal of activity is in connection with " recovered " tin. The treatment of tin-plate scrap and ordinary household empties must surely prove immensely profitable at times such as the present, particularly when it is remembered that recovery reaches a figure of 2 per cent. of the weight of scrap treated. Many of the larger corporations are beginning to appreciate the profit attached to processes of the kind, and we understand that at Birmingham a plant is being erected which introduces what may be called revolutionary features from the economic standpoint. In fact, Dr. C. M. Walter of the Birmingham Corporation Gas Department has devised a recovery process which bids fair to become generally adopted;

for, apart from simplification of plant, he has succeeded in reducing to a few minutes an operation which has hitherto occupied a whole day. One plant of the kind has already been proved in practical operation, and the results obtained from it have been such that it is now being duplicated on a considerably larger scale.

A Private Conference

THE conference held in London on Saturday to consider the formation of a federation of professional, technical, administrative, and supervisory workers on a definite labour basis was a private one. That is, it was private so far as the daily and the technical press is concerned, but we learn on inquiry that arrangements have been made for allowing a privileged report to appear in some particular journal, and chemists who want to know what happened, if they are sufficiently interested, must become subscribers to this quasi-official publication for one week at least. Whether this sort of arrangement is likely to strengthen confidence in the new movement, as one entirely free from party and political machinery, is a matter of opinion. We note it as a sign that the new democracy of labour prefers a judicially regulated publicity to the old kind, and as one more illustration of the less informed labour organiser's proverbial distrust of publicity.

What interests us most, however, is the attitude of the chemical associations which were represented there. Owing to the circumstances under which the conference was held, it is impossible to state what really took place, and if the account which has reached us is inadequate, the responsibility must lie with the organisers. Our information is that the National Association of Industrial Chemists and the British Association of Chemists were both represented, and that on behalf of at least one, if not both, a proposal was submitted expressing sympathy with the idea of federal relations but refusing to merge their identity and independence in the labour party in a political sense. This proposal, we understand, was lost, and a resolution was adopted approving a federation "on the general basis proposed in the draft constitution, with adequate provision for the grouping of societies in councils representing the various groups." Whether the chemical associations present accepted this, and how far the decision affects the third party attitude which they are understood to favour, the public may presently, perhaps, be graciously permitted to know.

The Calendar

Feb.		
16	Royal Society of Arts: "Recent Researches in the Cellulose Industry." First Lecture. Charles F. Cross. 8 p.m.	John Street, Adelphi, London, W.C.2.
17	Institution of Petroleum Technologists: "Recent Patents on Mixed Fuels." Paper by Dr. W. R. Ormandy. 5.30 p.m.	Royal Society of Arts, John Street, Adelphi, London, W.C.2.
17	Sheffield Association of Metallurgists and Metallurgical Chemists: "Steel Making in India." Dr. A. McWilliam.	Sheffield.
17	Manchester Municipal College of Technology (Dept. of Applied Chemistry): "Water Supplies—Their Filtration and Softening." Dr. G. G. Hepburn. 4.30 p.m.	Manchester.
17	Institute of Metals (Birmingham Local Section): "Radiography of Metals." Major Hall-Edwards. 7.30 p.m.	Chamber of Commerce Buildings, New Street, Birmingham.
17	Institute of Metals (Scottish Local Section). 7. p.m.	Royal Technical College, Glasgow.
17	Royal Institution of Great Britain: "Magnetic Susceptibility." Professor Ernest Wilson. 3 p.m.	21, Albemarle Street, London, W.1.
18	Institute of Chemistry (London Section): "Yeast." Lecture by A. C. Chapman. 7.45 p.m.	30, Russell Square, London, W.C.
18	Society of Glass Technology: Papers by E. B. Christmas and Dr. M. W. Travers. 3 p.m.	Mappin Hall, University of Sheffield.
19	Chemical Society. 8 p.m.	Burlington House Piccadilly, London, W.1.
19	Institution of Mining and Metallurgy. 5.30 p.m.	
19	Society of Dyers and Colourists (West Riding Section): "Research—Its Place and Function in an Educational System." Dr. H. H. Hodgson.	Bradford.
19	Royal Society: Papers by Professor B. Moore and T. A. Webster; Professor W. M. Bayliss; and the Rev. F. J. Wyeth. 4.30 p.m.	Burlington House, Piccadilly, London, W.1.
20	Society of Dyers and Colourists (Manchester Section): "The Properties of the Glyoxaline Ring." Professor F. L. Pyman.	Manchester.
20	Society of Dyers and Colourists (Huddersfield Section): "Research—Its Place and Function in an Educational System." Dr. H. H. Hodgson.	Huddersfield.
20	Society of Chemical Industry (Liverpool Section).	Liverpool.
23	Chemical Industry Club: "The Essential Factors in the Improvement of the Status of Chemists." J. W. Black. 8 p.m.	2, Whitehall Court, London, S.W.1.
23	Royal Society of Arts: "Recent Researches in the Cellulose Industry." Second Lecture. Charles F. Cross. 8 p.m.	John Street, Adelphi, London, W.C.2.
24	Manchester Municipal College of Technology (Dept. of Applied Chemistry): "Water Supplies—Their Filtration and Softening." Second Lecture. Dr. G. G. Hepburn. 4.30 p.m.	Manchester.
24	Sheffield Association of Metallurgists and Metallurgical Chemists. Discussion on "The Microscope."	Sheffield.
24	Royal Institution of Great Britain: "Magnetic Susceptibility." Second Lecture. Professor Ernest Wilson. 3 p.m.	21, Albemarle Street, London, W.1.
25	Royal Society of Arts: "Industrial Training." James Currie, C.M.G.	John Street, Adelphi, London, W.C.2.
26	Society of Dyers and Colourists (Bradford Junior Branch): "Sulphide Dyes," by W. G. Sewell. "Hydrosulphite," by N. Chappell.	Leeds.
27	Institute of Metals (Sheffield Local Section): "Standard Silver—Its Production and Working Properties." E. A. Smith and H. Turner. 7.30 p.m.	Mappin Hall, University of Sheffield.
27	Royal Institution of Great Britain: "Problems of Lubrication." W. B. Hardy. 9 p.m.	21, Albemarle Street, London W.1.

Atomic Weights and Atomic Numbers

By Dr. Stephen Miall

The idea dealt with in this article was worked out by the author in February, 1918, while an air-raid was in progress. The notes were written out the same evening, and later were circulated privately and excited considerable interest. Dr. Miall intended to pursue the matter further in 1919, but the annual meeting of the Society of Chemical Industry, and his subsequent visit to America, made this impossible. The Paper and diagrams are now published for the first time, and criticisms are invited.

It is easy to construct a diagram to show the atomic weights of the elements arranged in the order in which they occur in the periodic table. We can let the abscissæ denote the elements arranged in this order and placed at equal distances from each other, vacant places being left for the few missing elements which obviously remain to be discovered; the ordinates show the atomic weights.

It is perhaps more convenient to show this diagram in three parts, and Diagram I. shows the elements from hydrogen to nickel inclusive. It will at once be noticed that the atomic weights lie on a series of approximately parallel straight lines, and one may deduce from this fact a number of conclusions.

Let us first see to what degree of accuracy the atomic weights do approximate to parallel straight lines. The following table shows the actual atomic weights and what they would be if the lines were parallel straight ones.

	Calculated At. Wt.	Actual At. Wt
Line i		
He	4	4·00
C	12	12·005
N	14	14·01
O	16	16·00
S	32	32·06
Ca	40	40·07
Line ii		
Ne	20·25	20·2
Mg	24·25	24·32
Si	28·25	28·3
Line iii		
Li	7	6·94
Gl	9	9·1
B	11	11·0
F	19	19·0
Na	23	23·00
Al	27	27·1
P	31	31·04
K	39	39·10
Line iv		
A	40	39·88
Ti	48	48·1
Cr	52	52·0
Fe	56	55·84
Line v		
V	51	51·0
Mn	55	54·93
Co	59	58·97

It will, I think, be admitted that the chemical properties of an element depend upon its place in the periodic table, otherwise known as its atomic number. Mendelejeeff was able to predict with considerable accuracy the chemical properties of gallium, scandium and germanium merely from their position in the periodic table. The changes of valency, the power of forming chemical compounds, the solubility of these compounds and a variety of other chemical properties follow well-established laws, so that given the place in the periodic table we can specify the chemical properties of the element. We may, in fact, treat the chemical nature of an element as a function of its atomic number.

It is well known that there is a relationship between the atomic weights and the atomic numbers, but that the chemical activities of an element do not depend on its atomic weight. As evidence of the latter statement we may note:—

1. Elements exist with almost identical atomic weights and very different chemical properties—*e.g.*, argon and potassium.

2. The chemical properties of Te are not those which would be expected if the chemical activities of the elements depended on their atomic weights.

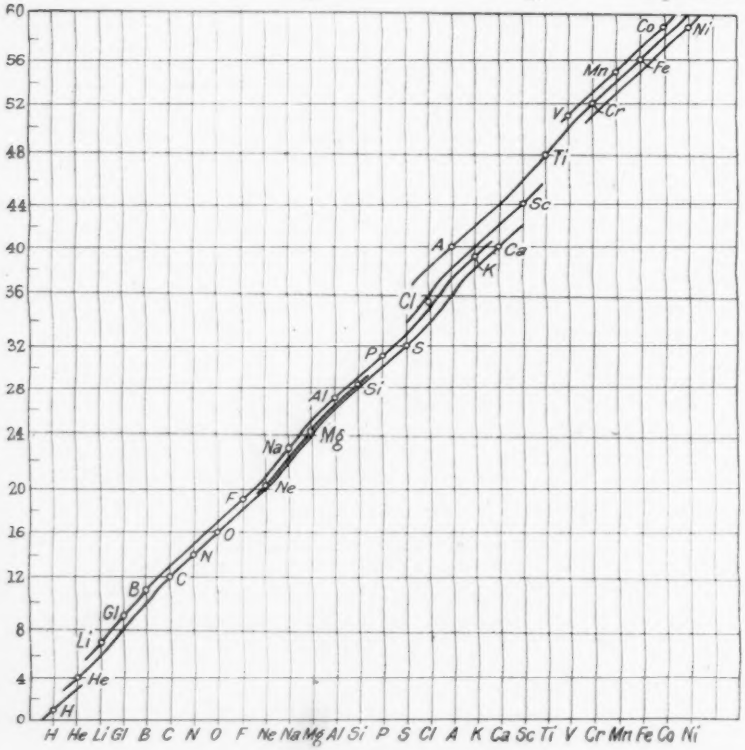

Diagram I

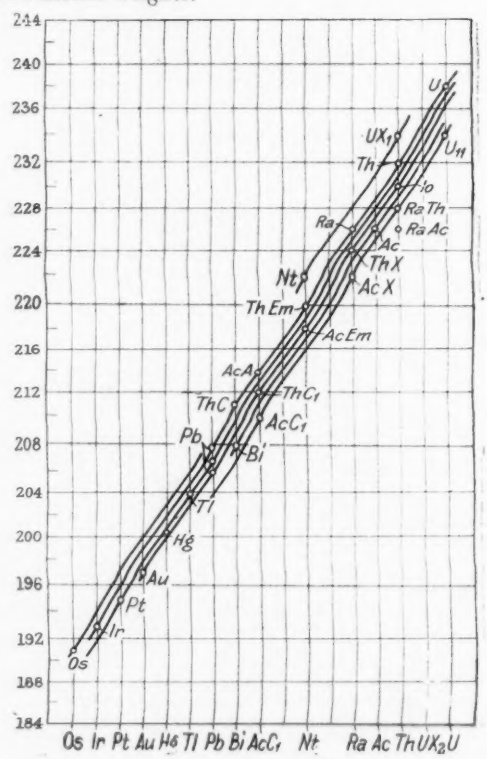

Diagram III

3. Lead is known to have an atomic weight which varies between 206 and 208.

4. Many radio-active elements are known having different atomic weights, but identical chemical properties, the so-called "isotopes."

It is interesting therefore, but not surprising, that Diagram I. shows that from a geometrical point of view one gets a confirmation—if any were needed—of these well-known phenomena.

The atomic weights shown in Diagram I. with few exceptions lie on lines represented by the equations $y=2x$, $y=2x+1$, $y=2x+2$, $y=2x+3$, $y=2x+4$, $y=2x+5$, where y is the atomic weight, and x the atomic number.

The atomic weights are therefore partly dependent on the atomic number and partly independent of it. The chemical properties of the element we have already noted are dependent on the atomic number. We are faced with the fact logically deduced from the above propositions that the atomic weights of the form $y=2x+a$ include a quantity "a" which is independent of the chemical properties of the element, and that the quantity "a" is usually a small integer. It is interesting that a geometrical investigation of the elements with low atomic weights leads to the same result as the experimental investigation of the elements with high atomic weights. Both investigations show that the atomic weight of an element may include something which is independent of chemical activity, and therefore leaves the chemical activity unaffected if it is increased or decreased.

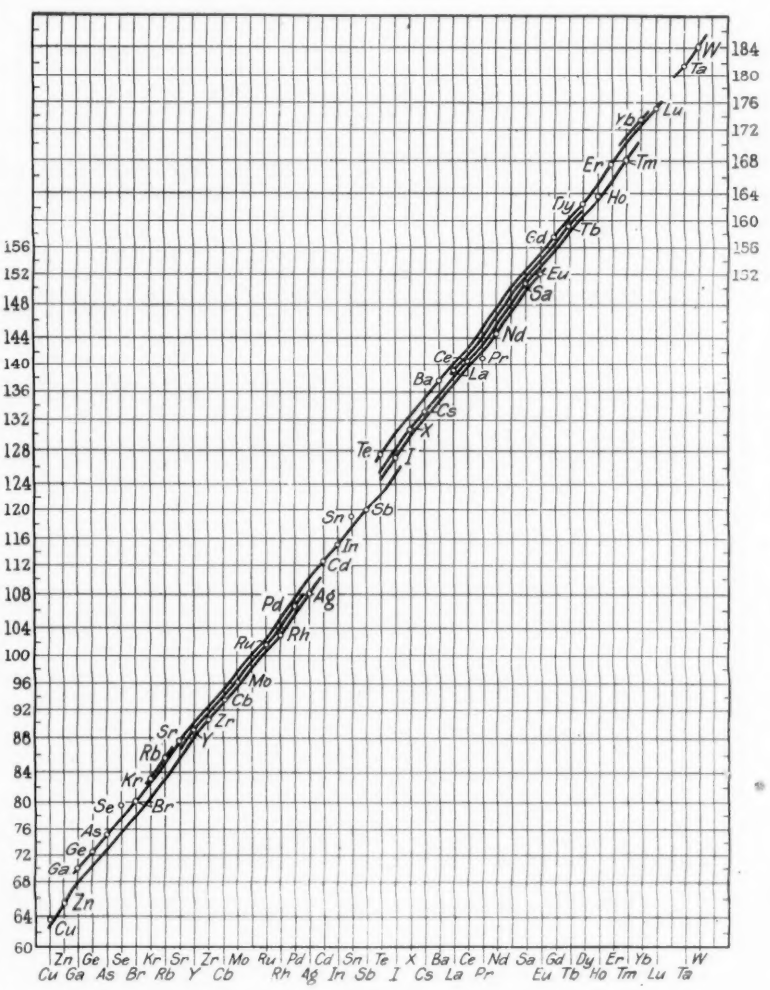

Diagram II

The Diagram I. enables us to calculate the amount of this independent or inert matter which I call "dead" weight. The elements whose atomic weights lie on the line $y=2x+1$, namely, *Li*, *Gl*, *B*, *F*, &c., contain 1 unit of "dead" weight more than those which lie on the line $y=2x$, namely, *He*, *C*, *N*, *O*. Argon, which is on the line $y=2x+5$, contains four units of "dead" weight more than potassium, which is on the line $y=2x+1$.

Hydrogen presents some difficulty. Its atomic weight is of the form $y=2x-1$, and though this conception is pleasing enough from the point of view of geometry, the average man finds it difficult to visualise an atom containing two chemically active units from which one inert unit is taken away. It rather reminds one of the man in De Morgan's "Budget of Paradoxes," who had one finger less than none on each hand.

Hydrogen must either (*a*) consist of one unit of inert matter, or (*b*) not belong to the series $y=2x+a$. As hydrogen is not inert we are driven to the conclusion that its atomic weight is not of the form $2x+a$, and it may belong to some other straight line; of these the lines $y=x$ or $y=\frac{1}{2}x+\frac{1}{2}$ seem to be the most promising. I am rather inclined to think that the "dead" weight usually is found to be an integer, and that hydrogen contains no "dead" weight, and that therefore He, C, N, O, &c., contain 1 unit of dead weight. But it might just as well be argued that hydrogen is so exceptional that one can base no such conclusion from its position.

It must not be assumed that what is not "dead weight" is chemically active. The existence of helium and the other inert gases proves the contrary; so do other known facts. "Dead" weight does not determine the chemical activity; the "live" weight determines the valency of the atom, which may be zero, and seems not to exceed 8.

Let us next consider the elements from copper to tungsten inclusive; these are shown on Diagram II., and they lie on lines of the form $y=2{\cdot}5x+a$.

I think the diagram shows why it is that tellurium has an atomic weight 0·5 higher than iodine. It has 3 units more "dead" weight, but iodine has 2·5 more "live" weight.

If this diagram correctly denotes the facts it follows that the atom may be composed of particles as small as 0·5 of unity, that is, $\frac{1}{8}$ of the helium atom or half an "α" particle and it looks as if—denoting a half α particle by the symbol M—the atom of hydrogen consists of $2M$, that of helium of $6M+1$, of lithium $10M+2$, of glucinum $14M+2$, and so on. If we assume m to be the "dead" equivalent of M, we get for—

H	the formula	$2M$
He	,,	$4M+2m$
Li	,,	$10M+4m$
Gl	,,	$14M+4m$,

and so on.

It rather looks from the diagram as if 2·5 of the atomic weight in the group of elements under consideration is usually chemically active, but that 1 may be chemically inactive, and this seems to point to the probability of a $\frac{1}{2}a$ particle being chemically active, but that 2 of them may be either active or inactive.

If one accepts the proposition that the atomic weight may be increased by unity without affecting the chemical properties of the element one must consider whether the radio-active elements and lead are the only ones showing the phenomenon of "isotopy," or whether chlorine, magnesium, silver and some others may not be mixtures of isotopes. It has been stated that in philology the vowels did not count and the consonants were inter-changeable. Nevertheless, something remains, and I suggest that even if atomic weights are in general regarded as subject to the phenomenon of isotopy, enough is left of their relationships to be of interest and value.

The atomic weights of the elements from platinum to uranium are shown in Diagram III., and they lie on lines of the equation $y=3x+a$. The radio-active elements having so many isotopes can, of course, be represented by other lines very simply, but the constant difference of 3 seems to fit the elements with high atomic weights the best.

In conclusion, it appears that one unit is sufficient for the chemical activity of hydrogen, that for the next 27 elements the addition of 2 units of "live" weight shifts the element into the next place, that for the next 45 elements the addition of 2·5 units shifts the element into the next place, and that for the remainder the addition of 3 shifts the element into the next place. It also appears that the atomic weight of all elements except hydrogen is represented by a formula of the nature $y=Mx+a$, where x is the atomic number and "a" a small integer, and that the chemical properties of the element are independent of a.

Colloidal Clay in Soap-making

To the Editor of THE CHEMICAL AGE.

SIR,—Supplementary to Mr. Weston's reply to the letter from Osmosis, Ltd., of January 31, as the patentees and producers of the colloidal clay which formed the subject matter of Mr. Weston's treatise, we claim that our patents of 1916-1917 were the first to solve the problem of obtaining without machinery a clay of the required purity, extremely fine state of sub-division, and highly colloidal properties on an economical and commercial basis. We have been producing and selling our colloidal clay for many trades and entirely new uses ever since.

In an article in the *Oil & Colour Trade Journal* of January 31st, the following observation was made *re* colloidal clay in soap: "There is not the slightest possibility of china clay being used in the manufacture of soap." We should like to say that the point is *not* what this journal and its friends think, but whether Mr. Weston's data and conclusions are correct; and, there is only one reply to this: they can be easily verified by experiment and practical test. Further, our colloidal clay is being used extensively already in some quarters in soap manufacture, all practical difficulties having been overcome by our patents.

We should like to make some supplementary remarks to Mr. Weston's reply to Messrs. Richardson & Pearson's letter. As regards Mr. Richardson it is quite evident that he either did not carefully read Mr. Weston's treatise or failed to understand it. Mr. Weston distinctly states that "chemically soap and clay belong to two distinct types of compounds; physically, however, the solutions of these bodies resemble each other closely . . . . the work soap does in washing can only be satisfactorily explained by the laws of colloidal chemistry." Do Mr. Richardson and Messrs. Pearson realise that in soap solution the colloidal part of china clay would remain in suspension, whereas the non-colloidal part would settle out? Further, do they understand that owing to its viscosity in aqueous solution, it would be impossible to incorporate clay with soap in the crutcher to the extent of, say, more than 5 per cent. without adding so much water that the clay would not dry in the frames, and if not sufficient water and too much clay were added, the actual stopping of the stirrers and perhaps the breaking of them, might take place.

These are two of the reasons why attempts at incorporating china clay in soap have hitherto been unsuccessful. These problems were solved by our patents dating from 1916.

The fact disclosed by Mr. Weston (who has been associated with us in a consultative capacity) for the first time that colloidal clay and sodium carbonate in aqueous solution show a lower surface tension against air than a solution of sodium carbonate is nothing short of startling and accounts for the increased lather in colloidal clay soap. In conclusion, the ignorance displayed even in technical circles seems to us so profound, in dealing with colloidal problems, that we venture to state that the time is overdue for the establishment of a national training institute in colloidal chemistry.

19-20, Holborn Viaduct, E.C.1. CATALPO CO., LTD.

To the Editor of THE CHEMICAL AGE

SIR,—Pray forgive me intruding again, but I am so much interested in this colloidal subject of soaps with clays in them that I venture to make a suggestion—a useful one, I think, having regard to the attitude of all experts in soaps towards the introduction of any kind of "filler" or "adulterant," whether possessing detergent properties or not. They, all of them, have got a bad name! And what is required now to make them respectable and popular is to give them an inoffensive and special name to apply to soap as margarine does to butter. At present *all* of these mixed soaps are bad sellers—whether they contain a mineral or a vegetable addition. They are called "sand-soaps!" Enough, surely, to act as an estopper to even a very good and cheap substitute for fat—even a refined fuller's earth.

But here is a chance for THE CHEMICAL AGE. What shall we call any kind of a soap containing as admixture with fatty-compounds anything to take the place of these fats—such as china-clay, talcum (sold as "fillers"), chalk, barytes, asbestos, seed husks, &c., or with solutions of magnesium salts, &c., and soaps filled with starch, or even my own proposal, an alkali-magma made with brewers' or distillers' grains? A great complex! Because now is the time, with fats so scarce for soap, to start a direct and declared business and manufacture in *substitutes*.

So, to give it a lead, I propose that we call all these kinds of soaps SUB-SOAPS, which is short and specific enough to "go" well with TUBS and SUDS—all in the SOAP-LINE!

I am not disposed to wrangle with our estimable friend over the way I put it for soap doing the washing, but as I happen to be in company with our old friend Roscoe, I am quite willing to remain there—undisturbed and unconvinced by any mere nomenclature! And this brings me to say that I not only think, but I am sure, that Mr. Weston has done soap a good turn in directing attention to some of its physical characteristics—outside the usual (good-selling) terms of appearance and texture employed by soap-boilers. For I find that even in the most recent books on colloidals, soaps get scant or no consideration. In fact, I was greatly disappointed in this particular in Victor Pöschl (Hodgson's translation, 1917). But what he says about clay is interesting: "In the natural state clay does not possess complete colloidal properties, but acquires them when stored. The purest clay, *i.e.*, kaclin, or china-clay, must be stored for months, winter and summer alike. Thereby the crystalline kaolin passes into the colloidal state, and is then plastic in the highest degree." So that we can learn a good deal from the potters, as well as the chemists, about how best to make clays good substitutes for fats!—Yours, &c.,

2, Aliwal Road, S.W. JAMES C. RICHARDSON.
February 10.

In the letter from Mr. Louis J. Riley, published on January 31, one paragraph was inaccurately printed. It should have read as follows: "As ordinary dirt may generally be regarded as consisting largely of clay, this application of the detergent qualities of highly colloidal clay affords another instance of the romance (and economic value) of science, in 'dirt' (and a sticky one too) being employed in removing dirt."

Organised Chemists and Labour

To the Editor of THE CHEMICAL AGE.

SIR,—I write you in appreciation of your Editorial note in the last issue of THE CHEMICAL AGE on the above subject, and to ask you to be allowed to put to Mr. Searle and Dr. E. K. Rodd a few questions which, if satisfactorily answered, will, I think, add largely to the membership of the National Association of Industrial Chemists and of the British Association of Chemists. Mr. Searle advises chemists against "flirting with Labour." My opinion is that we shall not only have to "flirt:" but to be "honourably married to Labour," if we are to have any power. There are two classes of men necessary to carry on the business (that is, production) of the country—the manual workers and the clerical workers. All others can, for a while at least, be dispensed with. The foreman of to-day was labourer yesterday, and to-morrow may be manager, so that any gap in the managerial staff could easily be filled from the ranks. The chemists have set processes going and put them in the hands of workmen to be carried on. We are assured that there is good trade in store for the next five years, so that *union chemists* can be dispensed with. Labour is necessary to do the work and clerks to keep accounts, &c. A whole army of leaders can be found in the ranks, and it is the men who have been labourers who make the best leaders. Labour is the only class or organisation which has had force or power to command notice and respect, and force is the only thing the employers will take notice of. They will not dispute the value of the scientific technical worker, but he is cheap and plentiful—thirteen to the dozen. When the men in question—the chemists—press for recognition and better pay, they will get it. To do this it will be necessary to press unitedly, not singly, and backed up by an alliance with Labour.

The first to feel the benefit will be the employer, for naturally he will say, "If I pay a chemist I am going to make use of him." National prosperity will increase, and we shall need to fear no foreign competition, which is often only our own kith and kin trained in the British schools, and forced to emigrate to foreign lands to get a living which was denied them in their own country. It is proposed to federate with the clerical unions.

I will now put my questions. Is a federation of clerical unions strong enough to command notice? What use is the clerical to the industrial unions? Are there not sufficient clerks outside the unions together with others who could soon be brought into line, to be able to carry on? I ask these questions as I do not know, but I have some idea of the power of the chemists' union at most works where chemists are employed; for each one so employed there may be two or three others who have been chemists or assistants, who are not in the chemists' union. There are also many chemists who are not in the union, and to keep them from joining they are called managers, assistant managers, &c. Then, again, there are hundreds of chemists being turned out from the centres of learning, having completed their training. What safe and sure way is there, other than having Labour as an ally, the only ally who can call attention to injustice? There can be no fear of restricted output, and I never saw much of it attempted. Restricted output is generally due to inefficient leaders who do not know how to make work a pleasure and an interest. It is the very life and breath of the chemist to increase production, reduce costs, lighten labour and make work easier and more a pleasure than a task. Chemists deserving the name soon produce a better feeling, if a bad one exists, in the men. We used to hear a lot from the employers, when workers claimed better treatment, about "killing the goose that laid the golden eggs," but it is plainly now the employer who is killing the—yes, I think, goose is the best word—that lays the golden eggs by keeping it short of corn.—Yours, &c.,

Moorgate, Stalybridge, Feb. 10. W. WARR.

$5\frac{3}{4}\%$ Exchequer Bonds, 1925

To the Editor of THE CHEMICAL AGE.

SIR,—It will be of interest to your readers who have converted the terminating Exchequer Bonds into holdings of the new issue, to know that I have received a letter from the Secretary of the Board of Inland Revenue in the following terms:—

"I have laid before the Board of Inland Revenue your letter in which you point out that the inclusion (as required by law) in the statement of a taxpayer's total income for the year 1920-21, ending April 5, 1921, of both interest received in the preceding year, without deduction of tax, on Exchequer Bonds which are converted into holdings of the new issue, and also the interest for the year 1920-21, taxed by deduction, on the substituted Bonds of the new issue might operate to create a hardship by affecting the rate of Income Tax chargeable or the title to Income Tax reliefs or, for the following year, involve liability to Super-tax which would not otherwise arise or effect the rate of Super-tax chargeable. With reference thereto I am directed to state that the Board are informed by the Chancellor of the Exchequer that it is intended to introduce, in the next Finance Bill, any legislation which may be necessary to apply, *mutatis mutandis*, in the cases now in question the provisions of Section 25 of the Finance Act, 1919. Such legislation would, of course, remove the possible hardships to which you refer."

It will thus be seen that my representations have met with the same success now as on the occasion when the Victory Loans were issued, and in connection with which the Section 25 referred to was introduced in the Finance Bill then before Parliament, and which was limited in its operation to conversions of securities into Victory Bonds and/or Funding Loan.

There is one point still in doubt in the Board's letter quoted above, and that is whether the proposed legislation will be applied to the current year of 1919-20 as well as 1920-21, but I am enquiring further as to this.—Yours, &c.

67/68, Cheapside, London, E.C. 2. W. R. FAIRBROTHER.

Patent Agents Under the new Act

(FROM A CORRESPONDENT.)

THE Statutory Rules defining the conditions under which persons are permitted to practise as Patent Agents under the new Act of 1919 have now been issued by the Board of Trade. They provide for the compiling and printing of an official Register of Patent Agents by the Chartered Institute of Patent Agents, such Register to be brought up to date and published not later than the end of February in each year. The register is to be limited to those who are able to furnish a statutory declaration, supported by evidence if necessary, that they were *bona fide* practising as Patent Agents before August 1, 1917. It is, however, provided that any "Agent" who is proved to have been guilty, during his practice, of such misconduct as would have rendered him liable to have been struck off the Register if he had been registered, shall not be permitted to be registered. Any person who has set up in practice since August 1, 1917, or wishes to set up in practice in future, is required to pass the Final Examination of the Chartered Institute of Patent Agents.

It is provided that the Institute must hold an Intermediate and a Final qualifying examination at least once a year, in such subjects and under such conditions as may be decided by itself. The Intermediate examination is open only to British subjects who have passed certain prescribed preliminary examinations and have been engaged as pupils or technical assistants to a Registered Patent Agent for three years; these conditions will be waived in the case of British subjects entitled to practice as solicitors of the Supreme Court of Judicature in England or Ireland, or as law agents before the Court of Session in Scotland. The Final Examination is open only to British subjects who have passed the Intermediate Examination and have been engaged as pupils or technical assistants to a Registered Patent Agent for five years; the conditions may be modified under circumstances similar to those affecting the Intermediate examination. The Rules also provide for the payment of certain prescribed registration fees, and conditions are specified under which persons may be removed from or restored to the Register. An appeal from any decision of the Institute may be made to the Board of Trade. These rules are directed to take effect from January 30, 1920.

These reforms in the conditions under which persons are permitted to practise as Patent Agents have long been desired by the better class of Agents, who desired to see the status of their profession raised, and the profession is now hedged round with conditions somewhat similar to those obtaining in the medical profession. Many inventors have, in the past, dis-

covered to their cost that the ability of certain "Agents" to advertise widely does not by any means imply a similar ability to draw up and secure good patents for their clients, and much expensive litigation has resulted from incompetence of agents and carelessness in the wording of specifications. The new Act does not, of course, remove the difficulty immediately, since it is only retrospective for about two years, but it will undoubtedly in time eliminate from the profession the undesirable type of "Agent" by imposing on all who aspire to enter the profession a standard of professional efficiency which is commendably high.

The Late Mr. C. E. Groves

MR. C. E. GROVES, F.R.S., whose death occurred on February 1, in his 80th year, succeeded Mr. Henry Watts in the editorship of the *Journal of the Chemical Society*, and was the first secretary and registrar of the Institute of Chemistry. His scientific education was received under Hofmann at the Royal College of Chemistry. In October, 1862, Mr. Groves became senior assistant to Dr. John Stenhouse, F.R.S., who had established a private laboratory for research in Rodney Street, Pentonville, and there he remained as factotum until Dr. Stenhouse's death in 1880. He then became lecturer in chemistry at Guy's Hospital. The greater part of Mr. Grove's scientific work was done in the Pentonville laboratory, and was published under the joint names of Stenhouse and Groves, though, in consequence of Dr. Stenhouse's infirmity, the work was mostly done by his assistant. Mr. Groves was a good manipulator and a skilful analyst, and not only assisted in the research laboratory but for five years also took part in the work of external assayer to the Royal Mint—an office held by Dr. Stenhouse until 1870, when it was abolished.

Fortuna Nitrate Co.

IT is announced that, subject to the conclusion of an agreement for taking over stocks and shares at market value, the board of the Fortuna Nitrate Co. have sold Oficina Aurelia for £78,000, payable during the next twelve months. An offer has also been received to purchase by instalments the two remaining properties of the company—the Carmela and Celia; and the directors think that the acceptance of this offer, and the sale of Aurelia, would result eventually in the payment to the shareholders of about £2. 10s. per share on liquidating the company. As, however, the purchase price would only be payable over a period of at least 18 months, and, as the standing of the buyers would not be known to the shareholders, the board cannot undertake the responsibility of recommending the acceptance of the offer. Having failed to obtain from these buyers a proposal for more rapid terms of payment, and being desirous of not losing an opportunity of disposing of the company's undertaking at what they consider to be an advantageous price, the directors are inviting the company's agents to intervene—by arrangement with the purchasers of Oficina Aurelia—by offering to take over for a lump sum in cash all the assets and liabilities of the company, the latter to include such risk as may attach to deferred payments.

Should an offer be made which the board could support, a meeting of the shareholders will at once be called to consider the question.

Society of Public Analysts

FOLLOWING the Annual General Meeting of the above Society, held on February 4 (to which we referred in THE CHEMICAL AGE last week), an ordinary meeting was held, over which Mr. Alfred Smetham, the President, presided. Two papers were read.

The first was by Messrs. F. S. Sinnatt and L. Slater on "An Investigation into the Composition of the Unsaturated Hydrocarbons Present in Coal Gas." The authors described experiments in which they had separated the bromine compounds of the unsaturated hydrocarbons present in coal gas in sufficient amounts to enable them to carry out a separation of the more volatile compounds. These showed that the percentage composition of the unsaturated hydrocarbons present in coal gas was as follows:—

	First Experiment per cent.	*Second Experiment* per cent.
Ethylene	84·0	84·3
Propylene	13·4	11·8
Butylene	1·75	2·35
Amylene	0·97	1·54

Mr. H. Trickett, in a second paper on "The Estimation of the Available Oxygen in Sodium Perborate and in Perborate Soap Powders," gave the most favourable conditions for the potassium permanganate and potassium iodide volumetric methods.

A gas volumetric method based on the reaction $NaBO_3 + CaOCl_2 + H_2O = NaH_2BO_3 + CaCl_2 + O_2$ was claimed to be as reliable as the given iodometric method and had the further advantages of greater rapidity to soap powder mixtures.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

LOCALITY OF FIRM OR AGENT.	MATERIALS.	REF. NO.
Egypt (Alexandria)	Lubricating Oils	166
Belgium (Liége)...	Lubricating Products	167
Portugal (Lisbon)	Cement	174
Africa (Morocco)	Glass	179
New York ...	Industrial Chemicals...	225
Italy (Milan) ...	Chemicals	213
Winterthur ...	Chemical and Pharmaceutical Products, Oils, Drugs, &c.	217
Privas (Ardèche)	Petroleum and other Mineral Oils ...	207
Bordeaux ...	Chemical Manures	209
New Zealand ...	Chemists' Sundries	195
Melbourne ...	Dyes, Chemicals, Waxes, &c. ...	183
Canada	Saponifiable Red Oil for Soap-making	—
Melbourne ...	Chemists' Sundries	186
Sydney and Melbourne	Oils, Greases, &c.	189

Catalogues Received

Lennox Foundry Co., Ltd.

This list of chemical plant and tantiron, designed for use in chemical factories, contains examples of mixing pans of varying capacity, elevators, pumps, pressure vessels, autoclaves, air compressors, blowers, grinding and drying plant, disinfectors, &c., with illustrations in each case. Many of the examples represent machines designed for special purposes.—Tantiron Foundry, Glenville Grove, London, S.E.8.

Adam Hilger, Ltd.

The numerous catalogues received testify to the very wide range of the astronomical and optical instruments manufactured by this firm. The first, a pamphlet dealing with the application of the various instruments in industry, was referred to in our last issue. There are also four booklets describing instruments used by chemists for the identification and estimation of substances, accompanied by an essay on Refractive Index, Absorption, Wave-length and Rotatory Power, in Relation to Molecular Structure. Other instruments include those used for the rapid testing of screws or small repetition parts; for showing the presence of strain in commercial glass articles; for measuring refractory indices of both solids and liquids; and for determining the annealing temperature of glassware. Illustrations are given of all instruments.—75A, Camden Road, London, N.W.1.

Verdite Industries

We have received a book dealing with the minerals drawn from the Verdite mine, which is situated in the Barberton district of South Africa. Although the mine contains deposits of the greenstone known as Verdite, as well as gold, nickel and talc (commonly known as French chalk), the book is mostly concerned with the latter product. In view of the publicity which has been given in THE CHEMICAL AGE to the introduction of colloidal clay in the manufacture of soap, it is interesting to note that talc is also used for this purpose. The Verdite soap, in which talc is used, is particularly suitable for use in the removal of grease, paint, &c., from the hands. The use of talc, however, is by no means confined to soap manufacture. Its usefulness extends over a very wide range of articles, including paint, varnish, enamels, glass, china and a host of others.—121, Eloff Street, Johannesburg, S. Africa.

Recent Wills

Mr. W. H Gibson, of 122, King's Road, Brighton, head of W. H. Gibson, Ltd., chemists, and at one time treasurer and auditor of the Pharmaceutical Society of Great Britain, left bequests to employees ... £32,180

German Chemical Industry

Report of the British Mission

It has been known that a report has been in private circulation for some time of a mission which investigated the conditions of the German chemical industry last year. Although regarded as confidential it could apparently be obtained for a fee, and its contents have been freely discussed at the chemical meetings. Summaries of it have now been published in the daily press. The mission, it appears, consisted of 20 members of the Association of British Chemical Manufacturers, representing the various branches of chemical industry. It was accompanied by a military representative, and also by four delegates, representing the Department of Overseas Trade, the Board of Trade, the Local Government Board, and Canadian interests.

The inquiry was conducted at the end of May and the beginning of June, 1919, the time spent in the occupied area being about a fortnight. In all, 39 works were visited, four in the Belgian zone north of Cologne, 25 in the British zone, mostly in the neighbourhood of Cologne, two in the American zone close to Coblentz, and eight in the French zone between Mayence and Mannheim.

For the purposes of the inquiry, the mission was divided into four sections: (1) Heavy chemicals; (2) Coal Tar Intermediates and Dyestuffs; (3) Fine Organic and Pharmaceutical Products; (4) General Inorganic Products.

The report points out that the vast scale on which many of the processes are installed, the vast scale even of some of their failures, is sufficient proof that the men controlling the industry are gifted with no mean order of courage. Nothing appears to have struck the mission more than the apparently unstinted outlay of money on laboratories, libraries, and technical staff, especially in the larger works.

Owing to the development of scientific management, of labour-saving devices and mass production, specialisation has now been developed to such an extent that all need for initiative and resource is confined to a few highly-skilled operatives, so that the great majority of the workers are only called upon to undertake simple and routine duties, which are monotonous in the extreme. The new ideas which have swept through Germany have made labour highly dissatisfied with this state of affairs, and this discontent is likely to play an increasing part in the immediate future. How long the conditions described are likely to persist it is impossible to say. Some improvement will surely take place, but it seems safe to predict that German labour, though it may well take on new forms of efficiency, will never again become the docile and obedient agent formerly so profitable to the German manufacturer.

One of the most striking sections of the report refers to the arrangements made for the co-operative working of German chemical industry so as to secure community of interests. No discussion of the industry would be complete without reference to the *Interessen Gemeinschaft* (I.G.), the parties to which, in the extended form established in 1916, are the eight firms: Farbenfabriken vorm. Friedr. Bayer & Co., Badische Anilin und Soda-Fabrik, A.G. für Anilin Fabrikation, Berlin, Farbwerke Hochst vorm. Meister Lucius und Brunning, Leopold Casella & Co., Kalle & Co., Chemische Fabriken vorm. Weiler-ter-Meer, and Chemische Fabriken Greisheim Elektron.

The I.G. system originated from commercial conventions for the maintenance of price during a limited time in order to prevent competition to the point of extermination between the firms that ultimately became parties to the I.G. This was done because their output was rapidly increasing before a sufficient outlet had been created.

The British manufacturer should consider seriously whether the large plants for the production of heavy chemicals, such as sulphuric acid, caustic soda and the like, which are operated by the great German firms, are not a serious menace to the position which he has so far held in the manufacture of these products and of others in the production of which they are used.

Shortly before, and particularly during, the war the branch of chemical industry concerned with nitrogen products was one in which great developments had been effected in Scandinavia, America, and particularly Germany, but, to our loss be it said, not in this country. The first step was taken when the Birkeland and Eide process was introduced at Notodden in Norway in 1903. Later on, works were erected in Norway by the Badische Anilin und Sodafabrik, who, however, soon gave up their interest in the works and took their capital back to the Rhine, having meanwhile devised a process of a different order, involving the direct formation of ammonia from nitrogen and hydrogen under the influence of a catalyst.

The Haber process had been developed on a very large scale before the war, and the manufacture was still further developed during the war. Two large plants have been installed to work it, one at Oppau, near Ludwigshafen, and the other at Merseburg. The capital outlay on the former works is said to have been five millions sterling. Still more surprising, however, is the fact that a scientific department in association with the works has been erected at a cost of half-a-million. Scientific insurance of industry has never before been effected on so liberal a scale. Those who have seen the works at Oppau describe them as astounding examples of German thoroughness and efficiency, fitted with the most perfect machinery for compressing and otherwise dealing with the gases. In fact, they are great engineering workshops.

During the war the Germans also greatly extended their plant for the manufacture of cyanamide, using this as another source of ammonia. In this case the factory erected has been built in the immediate neighbourhood of the cheap fuel supply afforded by the field of brown coal near Cologne.

Having secured a supply of ammonia, the Germans have developed a process for its conversion into nitric acid, by passing a heated mixture of this gas with air through platinum gauze; they have thus rendered themselves entirely independent of outside supplies of the materials required for the manufacture of the acid. It is probably to this circumstance alone that they owed their ability to carry on the war during so long a period. Of two plants erected at the Hochst factory for the oxidation of ammonia to nitric acid, one was capable of producing the equivalent in nitric acid of 6,500 tons, the other of 10,000 tons of nitrate of soda per month. The latter is the more recent plant, having been completed in February, 1918, at a cost of 40 million marks.

The "ammonia" future would thus appear to rest with Germany—she will probably be able to control at least the European market.

The chief value of the section devoted to dyestuffs and intermediates is to be found in the general impressions recorded by the mission. The work of the mission was here subject to many difficulties, owing to the obstacles which were everywhere placed in order to prevent them from gaining definite information. One of their chief impressions, after inspecting the German works and realising the scale of manufacture of both intermediates and finished products, is the necessity for cordial co-operation on the part of all British chemical manufacturers.

From Munitions to Dyestuffs

Lecture by Dr. J. B. Oesch

Under the auspices of the West Riding Section of the Society of Dyers and Colourists, Dr. J. B. Oesch, Lecturer in Colour Chemistry at the Leeds University, gave a lecture in the Hotel Metropole, Leeds, on Thursday, February 5, entitled "From Munitions to Dyestuffs." Dr. J. C. Oxley presided.

Selecting certain gas warfare products—chlorine and phosgene—and two important explosives—picric acid and T.N.T.—Dr. Oesch discussed the suitability of employing these, or the plant by which they were manufactured, for the preparation of important products in colour chemistry. He described in detail the manufacture of chlorine and phosgene, and said that the former could be utilised in enormous quantities for the manufacture of dyes and their intermediates, for it gave a brilliant hue and made the colour matter "fast" both to light and washing. Phosgene could be used in colour chemical operations for the preparation of "intermediates" which, by additional transformation, could be turned into very fast direct cotton dyes of great brilliancy.

Describing the process of manufacturing picric acid, the lecturer said that it was worth noting that at the beginning of hostilities the industry was located in Yorkshire. The amount of picric acid produced in this country in 1913 was 331 tons, whilst in 1918 the amount was raised to 15,160 tons. Dr. Oesch further described the phenol and chloral benzine processes of manufacturing picric acid, and mentioned how the country had benefited from the enterprise shown in the manufacture of this acid by the firm of L. B. Holliday & Co., of Huddersfield, who, starting in September, 1915, gave their first delivery in February, 1916—a remarkable achievement in view of the fact that all the plant had to be re-erected. About 8,000 tons of this acid were delivered by the firm during the war period. Picric acid—although not important as a dye, with the exception of dyeing wool a yellow shade—was of much importance for the preparation of "intermediates," from which important chrome dyes could be obtained.

Concerning the manufacture of T.N.T., Dr. Oesch said that the amount manufactured before the war was about 143 tons, while at the time of the signing of the armistice, the yearly output was about 85,000 tons. The total quantity of T.N.T. manufactured in England during the war was about 240,000, as against 69,000 tons of picric acid. One of the largest T.N.T. factories was at Queensferry, where some 55,000 tons were manufactured during the war. The products manufactured at the Queensferry factory during 1918 were valued at nearly £5,000,000.

Dr. Oesch was optimistic regarding the prospects of converting the war factories to peace-time uses, and said that, if the Germans could manufacture explosives in plant formerly used for making dyes, nothing need prevent England from reversing the operation and making dyestuffs and intermediates in explosive factories.

From the Frankland Testimonial Committee the University of Birmingham has received a portrait in oils (by Munns) of Dr. Percy F. Frankland, F.R.S., until recently Professor of Chemistry at the University. Dr. Frankland was succeeded by Professor Gilbert T. Morgan.

Filter Presses: Their Construction and Uses

Lecture by T. H. Lait

AN instructive lecture on filter presses was given by Mr. T. H. Lait (the Premier Filter Press Co., Ltd., London) at the Manchester Municipal College of Technology on Tuesday, February 3. The explanation of the subject was made considerably clearer owing to the fact that the lecturer had provided a large quantity of laboratory-scale apparatus and parts, all of which were of excellent construction and of thoroughly practical working value.

General Description

Mr. Lait said that he did not propose to deal with the question of filtration alone, but to give, as far as possible, complete details as to the various constructions and methods of application of the most up-to-date machines generally used. The general construction and main outlines of the filter press had not altered greatly for some years. Many experiments had been made, and many time-saving devices adopted, but the actual internal arrangements had remained much the same.

Mr. Lait first dealt with a machine which was quite simple and easy to erect and handle, and of which a laboratory-scale example was shown. It consisted of a fixed headpiece and a fixed horse, the two parts being connected by means of round bars, thus forming a skeleton for the insertion of the other parts. Between the fixed headpiece and the horse a movable headpiece was placed, and between the headpieces a number of chambers were introduced consisting of alternate solid plates and hollow frames, or solid plates with bevelled edges, which created hollow spaces similar to those made by hollow frames. Machines with solid plates and hollow frames were generally known as "frame presses," whereas those with plates which had bevelled edges were called "chamber presses." The actual work done with either type was much the same, and the selection of one or the other usually depended upon the material to be dealt with. In all cases the margins were planed absolutely true, so that there was no leakage when the press was closed, and these margins varied in width according to the size of the plate and whether it was in iron or in wood. The centres of the plates formed the actual filtering surface, and were generally either in the form of corrugated ribs which were rounded at the top, and formed channels about ¼ in. deep, running vertically over the whole surface (except for a few horizontal ones at the top and bottom), or a surface consisting of rows of flattened points which served as a support for the filter cloth in the same way as corrugations. Either of the surfaces could be covered with a perforated sheet if necessary. The channels allowed a free and quick exit for the filtered liquor at the bottom corner of each plate, by means of a tap or united efflux channel. When taps were used they discharged into a trough running the necessary length, and from this the filtered liquor could be run off to a sump. To complete the machine for work each plate was covered with a filter cloth, and this formed a medium with which the filtration was begun. When the filter cloths were adjusted the plates, or plates and frames, were all moved up towards the fixed headpiece, the movable headpiece run into position, and the press closed by means of tightening gear provided. The form of tightening gear depended upon the size of press. It was necessary to understand that whatever tightening gear was used it was intended solely for the purpose of keeping the press closed tight, and did not operate as a squeezing mechanism. All the pressure used came from the pump or whatever means were used for feeding the press.

"Filtration"

The term "filtration" was used in connection with these machines, and in a sense it was quite correct, but it was necessary to bear in mind that it was the separation of solids from liquids that was really aimed at, and in some cases the recovery or elimination of any soluble matter which remained in the solids after this separation was effected. Another point which might appear to be remarkable was that although a filter cloth was used, and had to be carefully selected for different materials, it was not really the filter cloth which did the filtration. This would be readily realised when it was observed that the filter cloth became covered with a skin of the solid matter directly the press started working. The filter cloth served only as a support for the skin, all further liquor going through this formation, so that it was the material that filtered itself, and the rate of filtration largely depended upon the porosity of the solid matter which it was desirable to form into cakes. The cakes formed evenly over the whole filtering surface; they did not start from the bottom and build up from there, but from the two filtering surfaces towards the centre, so that if the press were opened before the operation was finished there would be found, say, ½ in. of solid matter distributed evenly on each side of a chamber and a sludge or semi-liquid mass in the centre. This had been proved by alternately pumping in black, white and red materials, the cakes thus formed having the appearance of a jam sandwich, red in the centre, white on each side of the red, and black on the outsides.

Filtering Surface

One very important feature of a filter press was that it gave the largest possible filtering surface in the smallest possible space. The plates were provided with the filtering surface on both sides, so that with an iron press having, say, 50 chambers and plates 40 in. square there was obtained (allowing for the margins) a filtering surface of about 1,000 sq. ft. The capacity depended upon the thickness of the cake that could be formed and the specific gravity or apparent density of the solid material. A press of the size mentioned, with 1¼ in. frames, would, when full, hold 45 cubic ft. of pressed cake, so that if the solid matter had the same weight as water, there would be "dropped" about 1¼ tons of pressed cake at the end of each operation.

Mr. Lait then referred to an operation where only filtration was necessary—*i.e.*, where it was only a question of separating some solid matter from a liquid mass and forming the solids into cakes. For this purpose only one channel was necessary, and the material entered by this means, and filled all the hollow spaces or chambers simultaneously.

Drying Cakes

The cakes formed contained anything from 25 per cent. upwards of moisture. If it were desirable to reduce this, all presses were fitted with a supplementary valve which allowed compressed air to be forced through the cakes. There were two ways in which this could be done. The air could either filter through the feed channel, following the same course as the filtered liquor, or a separate channel could be provided which allowed the air to enter behind the filter cloth of every alternate plate. Cakes formed from oils did not as a rule give up their moisture under air pressure, but would readily do so if steam were used.

There were many cases of oils where the precipitate to be removde was so fine that under normal conditions cakes could not be formed at all. In such cases it was usual to add some neutral material such as Fuller's earth or an infusorial earth like Kieselguhr or Tonsil. Fuller's earth or Tonsil were also used for bleaching the oil before filtration. Such substances served to break up the slimy particles which made the formation of cakes impossible, and quite good cakes could then be obtained. Such cakes could be heated with steam and the oil remaining in them recovered. The same remarks applied to many sugar liquors, but in that case lime or charcoal was generally used. There were also cases where the precipitate was so fine that cakes could not be formed at all, and where the addition of anything to assist the filtration was not permissible, and the operator had to be satisfied with getting as much solid as possible on the cloths and scraping it off. Even then, a filter press offered great advantages over other methods on account of the large filtering surface, and the easy way in which the filter cloths could be cleaned. In this connection Mr. Lait instanced gravitation filter presses, which gave 730 sq. ft. of filtering surface in a machine occupying overall 13 ft. 6 in. long by 3 ft. 8 in. wide by 4 ft. 2 in. high.

Extraction and Reverse Washing

Mr. Lait now turned to the consideration of the more complicated presses fitted with the thorough extraction and reverse washing arrangement. It must be borne in mind that there were cases in which it was the liquid part of the mass to be filtered that was wanted, in some, the solid part; while in others, both were valuable. Before describing a complete operation Mr. Lait explained in detail, by means of photographic illustrations the operation of the various channels, valves, efflux taps, &c., in connection with the arrangement. A normal washing press could be described as a press with efflux taps to each chamber. He termed it a normal press, because it was the type most generally in use, but where a united efflux channel took the place of efflux taps for the filtered liquor the mode of procedure had to be somewhat altered. It would be assumed that the filtration process was finished, leaving in each chamber a cake of solid matter which contained a certain percentage of moisture or liquid which was worth recovering, or for some reason had to be got rid of. Practically, what happened was that a vertical sheet of water was formed behind each cake, and passed horizontally through it. As in the case of feeding, the whole contents of the press were dealt with simultaneously. The time required for washing depended a great deal upon the nature of the soluble matter to be recovered or removed. It was more or less a question of displacement, that is, the wash water should force the soluble matter out of the cakes in front of it so that the first wash water runnings should be practically as strong as the mother liquor itself, and the strength gradually diminish, until only water was coming through. When required, a control apparatus could be placed behind the wash water exit valve. This took the form of an overflow pipe with a cup at the top in which an hydrometer could be put to register the gravity of the wash water. As soon as the instrument registered "O" it might be assumed that there was very little soluble matter left in the cakes. The question had often been asked as to why the wash water was put in at the bottom of the press, and taken off at the top. The answer was that water would always take the line of least resistance. If it were allowed to enter at the top and be taken off at the bottom, there was always the chance that the top sections of the cake would not be washed at all. By the adoption of this system the cakes could be washed in five separate and distinct ways, all of which Mr. Lait fully explained, though it was rarely necessary to use any but the first system mentioned.

Practically the same remarks applied to the passage of air or steam through the cakes, except that in such a case it was better to

use bottom exits so that the liquor had the easiest chance of getting away. In giving this explanation, the lecturer had been dealing more or less exclusively with an iron filter press of the frame type, but exactly the same line could be taken in dealing with a chamber press, except that the feed channel would be in a different position, either in the centre, or one of the corners, or in any other position preferred.

Wooden Presses

Coming to filter presses which had to be supplied with wooden plates and frames, Mr. Lait explained that outside lugs for the channels were not permissible, and they were therefore arranged in a side section. The press was manipulated in exactly the same manner as an iron machine. Wooden filter presses were used in most cases where the material to be dealt with must not come in contact with iron, though generally the skeleton framework of the press was made of that metal. The reference of course, was to the plates or plates and frames and the trough for the filtered liquor. They could be made either as frame presses or as chamber presses, according to requirements, and the position of the feed channel could be varied in the same manner as with iron presses.

In selecting a press, whether in iron, wood or anything else, the question as to whether frame presses or chamber presses should be adopted, depended almost entirely upon the nature of the solid matter that had to be removed from the sludge. Frame presses were usually preferred on account of the easy method of fixing the filter cloths, and the likelihood of less wear and tear of the material.

Mr. Lait then gave a practical demonstration of the fixing of the filter cloth in a chamber press.

In selecting any type of press, consideration must be had to the possibility of narrow channels becoming choked with solid matter. With a frame press a comparatively narrow passage was inevitable from the feed channel to the interior of the frame in which the cake had to be formed. If the material to be filtered contained anything in the nature of small lumps, fibrous matter, or anything likely to clog a narrow aperture, a frame press was likely to cause trouble. With a chamber press there was a straight through channel, which would be difficult to block, but against that there was the disadvantage of adjusting the filter cloths, particularly where this was necessary at comparatively frequent intervals.

Mr. Lait expressed the opinion that no works of any size should be without an experimental filter press in its laboratory, as the results obtained from them were a clear indication of what might be expected from the operation of a larger commercial installation.

Mr. Lait then dealt with several of the more or less unusual types of filter presses, giving a detailed explanation of the gravitation filter.

Types of filter presses with heating and cooling arrangements were then explained, and also methods of filtering volatile liquors, such as petrol, benzine, &c., with which there was bound to be a certain amount of evaporation, chiefly owing to the percolation of the liquor through the filter cloth.

Taps and United Efflux Channels

In determining whether a press should be fitted with efflux taps to each chamber or a united efflux channel, it should be borne in mind that if the latter were used the manipulation of a washing press became rather more complicated, because if the filtered liquor were allowed to make its exit from all the plates on one side there would be an exit for the wash water from the same plate that it entered by, thus causing a short circuit and providing no washing at all. In such cases, therefore, half the filtered liquor was taken off by the united efflux channel and half by the wash water channel, which during filtration acted as a united efflux channel for half of the filtered liquor. The point was further explained by the aid of a photographic illustration.

After having exhibited and explained photographs of various devices for tightening up filter presses, Mr. Lait concluded his lecture by remarking that it would be easier to mention those industries which did not use some form of filter press than those which did.

THE VICEROY OF INDIA, in his speech at the opening of the Imperial Legislative Council at Delhi on January 30, referred to the recommendations of the Industrial Commission, and said that in order that there should be no undue delay in pushing ahead with practical schemes three specific measures were proposed for the purpose of dealing with the questions that were obviously most urgent. These were, first, the creation of an interim central authority for the purpose of designing new official machinery and establishing a system of co-operation with the Provincial Governments; second, the formation of conditions for the establishment of the necessary scientific services; third, the institution of a system for the local purchase of Government stores. All three proposals having been sanctioned by the Secretary of State, a committee was appointed to advise on the best lines of organising the chemical services, which are the most urgently required of those necessary to deal with their neglected raw materials. They had been fortunate in obtaining as chairman of this committee Professor Jocelyn Thorpe, the distinguished Professor of Organic Chemistry at the Imperial College of Science and Technology in London, and it was hoped the proposals of this committee would be ready by the end of April.

Glass Research Appointment

Criticism by Mr. Travers.

REFERRING to the appointment of Mr. R. L. Frink, of Lancaster, Ohio, to be director of research of the Glass Research Association, Mr. Morris W. Travers, in an article in *Nature*, states:—

The appointment raises a question which has intimate relations with scientific interests and progress, and it should not be permitted to pass without protest. It has always been accepted as a cardinal principle by men of science generally that scientific research can only be rightly understood and sympathetically promoted by a director who has himself taken part in it. The essential qualification, therefore, of a director of research of each of the industrial research associations should be proved capacity for research; for without such aptitude the work undertaken is bound to be narrow, and the scientific aspects upon which progress ultimately depends to be neglected. This point of view, however, seems to have received secondary consideration only in the recent appointment; for what the secretary of the Glass Research Association says as to the qualification of the director of research is: "Mr. Frink has a lifelong experience of the American glass trade and glass research, is well known to the foremost English glass manufacturers, and his appointment is welcomed by the British glass industry."

It is scarcely too much to say that this appointment has been received with intense astonishment by all scientific men connected with the glass industry, and by many glass manufacturers as well. In the glass industry, more, perhaps, than in any other, it was naturally expected that a director of research would be a man of distinguished eminence whose work was of proved scientific value; yet practically no such evidence is forthcoming in the case of Mr. Frink. A scientific friend in America, who is recognised as one of the first authorities upon scientific matters connected with glass, tells me that Mr. Frink is not known as a research man or in research circles, but that he is highly spoken of by practical glass-makers "as a man of long experience in the window-glass trade who is accustomed to be called in as 'first aid' for furnace troubles, colour troubles, and the like technical difficulties. This trade he has pursued for some years with success, and his reputation in this domain is among the best. He maintains a so-called laboratory, and has a number of technical assistants, and, I fancy, has gathered together a considerable amount of rough-and-ready wisdom which has found extensive application in an industry where research laboratories have hardly been thought of until recently."

It seems quite possible that the Glass Research Association has secured the services of a very able, practical man, but in making the appointment the council of the association has negatived the policy elaborated by the temporary secretary of the association in the article published in *Nature* of November 13 last: "The ideal director for this association is not an individual research worker whose glory is to work in splendid isolation, but is he who will bring expert knowledge of the methods of scientific research to bear upon these complex problems, who possesses such personality as to attract promising young research workers to his side . . . and to co-ordinate the efforts being made through the various laboratories, institutions and works to which specific research and experimental work will be allotted."

If the writer of that article had been a scientific man, he would have realised that our greatest investigators rarely "work in splendid isolation," but that only a man who has proved his capacity as an investigator can lead and co-ordinate research. It is certain that British scientific men will not submit to control and direction from the practical man; thus a definite breach is opened between science and an important branch of industry.

It has not been sufficiently clearly realised that scientific and industrial research is passing out of the control of the recognised scientific and technical societies and institutions and of the universities into the hands of the Department of Scientific and Industrial Research, and, in accordance with the Government policy, the secretary of this Department is an administrator without practical knowledge of science, industry or research. The associations which are formed under the ægis of the Department are governed by councils upon which organised science is unrepresented, but to which the Department may nominate scientific men. To the council of the Glass Research Association the Department has nominated two scientific representatives, one of whom is in India. On the executive committee science is not represented; and when this appointment was discussed between that body and the secretary of the Department, the scientific aspects of the case can have received no consideration. As the Department controls funds for research which are vastly greater than those at the disposal of the Royal Society and all the other societies and universities put together, the outlook for science is a poor one unless scientific men are prepared to take united action with the view of securing a proper share in the control of research.

A 40-TON FURNACE burst on Monday in the smelting shop at the Hallside Steel Works, Cambuslang, near Glasgow. A number of workmen were badly injured, four furnacemen so seriously that they were taken to the Glasgow Royal Infirmary in a critical condition.

Fine Chemicals and Drugs

Progress in British Production Since 1914

IN THE CHEMICAL AGE of January 24 we published an article reviewing the progress made in Great Britain since the beginning of the war in the production of synthetic drugs and chemicals. A writer in the Board of Trade Journal of this week deals with the same subject. After a general review of the position in which the war found us, the following notes are given on the progress made in various branches of the fine chemical and drug industries:—

Synthetic Drugs

Before the war the United Kingdom, like the rest of the world, was dependent upon Germany for a large number of synthetic drugs, chiefly derived from products of coal tar—a raw material which was exported in very large quantities from this country to Germany. Some of these drugs were of the highest importance in the treatment of disease. Among them were the local anæsthetics, Novocain and Eucaine; the salicylate group, Aspirin, Sodium Salicylate, &c.; the analgesics, Phenacetine and Phenazone; and the highly important anti-syphilitic remedies, salvarsan and neo-salvarsan. The sudden stoppage of the flow of these products into Great Britain gave rise to apprehension that a serious shortage would be felt when the stocks already in the country began to be exhausted. Fortunately, however, the enterprise of British scientists and manufacturers, assisted by the Government, and with the invaluable aid which the Royal Society, working in co-operation with the National Health Insurance Commission placed at the disposal of the British fine chemical industry, was equal to the occasion. A few months after the outbreak of war Biritish salvarsan and salicylic acid were on the market, and other drugs soon followed, and before hostilities had ceased there was hardly a synthetic drug of real importance that was not being made in this country, and for the most part in quantities that not only sufficed for home needs but allowed a considerable margin for export, but in order to make the country self-supporting it will be necessary temporarily to give some form of Government assistance. Production of many of these synthetic drugs here is still in its infancy and is specially vulnerable to foreign competition.

Synthetic Photographic Chemicals

The principal substances in this class are *Amidol*, *Metol*, Paramidophenol, Glycin and Hydroquinone. Before the war they were entirely obtained from abroad, principally from two large houses in Germany. Their supply became of great importance chiefly for aerial and X-ray photography, and consequently works were erected and plant installed for their manufacture. Large quantities, except in the case of Hydroquinone, have been supplied to the Government Departments concerned, the output has been increased with consequent reduction in price, and we are now able to meet all our requirements and have a considerable surplus for export. Germany will doubtless spare no effort to regain her trade here, but the manufacture has been so successful in this country that, provided the industry is safeguarded for two or three years, we should be able to hold our own when conditions become more stable. The remaining problem to be solved is the manufacture of Hydroquinone, the whole supply of which came from America during the war. Under existing circumstances manufacturers naturally hesitate to instal expensive plant while they are exposed to foreign mass production, but the process has been worked out, and with the assurance of protection for a definite time, production would certainly follow.

Syntheic Perfumes and Flavourings

Synthetic perfumes and flavourings—including esters—represent a considerable industry which before the war was largely in the hands of foreigners, but of which, during the war, the manufacture was taken up in this country. Included in the substances which were previously made from German intermediates, but of which production here has been developed, may be mentioned Aubepine, Heliotropine, Ionone, Methyl Acetophenone, Vanillin and many esters, such as Amyl, Butyrate and Salicylate, Benzyl Acetate, Chloride and Benzoate, Butyl Acetate and Butyrate; Ethyl Acetoacetate, Butyrate and Chloride; Methyl Acetate and Salicylate. The raw materials, or intermediates, required are in many cases identical with those required for dyes, a fact which gives the Germans a great advantage with their strong dye industry.

Synthetic Tannins

Synthetic tannins were almost entirely supplied by Germany before the war. Neradol was the principal substance in this class, and Ordoval came out subsequently. On the outbreak of war their manufacture was taken up in this country by several firms under of Board of Trade licence, and they were put on the market as Syntan, Maxyntan, Paradol, Cresyntan, Synthetic Tannin, &c., some of which at any rate are improvements on the German materials. They are very valuable in the leather industry, and for some processes are practically essential. Further work is still required and is being carried out to enable these synthetics to have the same filling properties as the natural products. The tendency at present is for them to give a somewhat more porous leather.

Gallic and Pyrogallic Acid

These two acids are dealt with together as they are interdependent. Unless Gallic Acid manufacture is developed the supply of Pyrogallic Acid will fail. The manufacture of both these acids has been started since the outbreak of war. Gallic Acid is prepared from Chinese gall nuts and is made in three qualities: (1) Technical Anhydrous, used for dye manufacture; (2) Technical, for writing inks and the manufacture of Pyrogallic Acid; (3) Pure P.B., for ferrogallic paper, pharmaceutical purposes and for certain inks. There is ample plant capacity in this country for all present requirements and a surplus for export. Pyrogallic Acid is made from Gallic Acid and is prepared in two qualities: (1) Technical, (2) Crystals. It is used in photography, medicine, hair dyes, and fur dying. The "resublimed" quality is not yet made in this country, but the preliminary experimental work has been carried out, and it is believed that manufacture will shortly begin. The plant capacity of pyrogallic acid manufacture is sufficient for all present requirements.

Hydrosulphites and Allied Bleaching Compounds

Before the war these were all obtained from Germany under such names as Hydraldite, Burmol, Rongalite, Decroline, &c. They comprise the following chemicals: Sodium Hydrosulphite, Sodium Formaldehyde Sulphoxylate, Mono and Di, Zinc Formaldehyde Sulphoxylate, &c., and the English-made substances are sold under the names of Hydros, Rubol, Formosul, Zinc Formosul, &c. During the war the plant was erected in this country, and very large quantities of hydrosulphites were manufactured. The plant is being enlarged in order to deal with foreign markets as well as to supply all home requirements. The chemicals are used in sugar refining, but principally in the textile trades for indigo dyeing, for stripping colours from dyed fabrics, and for discharge work in calico printing, &c.

Lactic Acid

Lactic acid is of great importance in the leather industry and in dyeing, and there may be large calls for it in the explosive industry. Before the war it was principally obtained from America and Germany, only a small quantity being made in this country. Owing to the large quantity required for preparing leather for army boots, extra plant was installed and the output considerably increased. At the present time the existing plant is more than sufficient to meet all the requirements of the country, leaving a large surplus for export. Lactic acid is very vulnerable to foreign competition, because in America the raw materials, molasses and maize, are obtainable at low prices, and in Germany beet molasses and potato starch, of which there is an abundant supply, are also very cheap. Hitherto only a small amount of edible lactic acid has been produced in the country, but attention is now being given to this quality.

Barium Compounds

The raw materials—Heavy Spar (natural barium sulphate) and Witherite (natural barium carbonate)—exist in large quantities in this country. The manufacture of barium compounds has been been largely developed during the war, though previously they were almost exclusively supplied by Germany. Barium nitrate is used in explosives and pyrotechny. Barium chloride is of considerable importance in the colour industry. Barium peroxide is the principal compound manufactured, the intermediate compounds in the preparation of which are barium sulphide, precipitated barium carbonate and barium oxide. The peroxide of barium is used as the basis for the manufacture of peroxide of hydrogen (*see* "Artificial Peroxides"). Precipitated barium sulphate (Blanc Fixe) is a by-product in the manufacture of hydrogen peroxide, and its supply depends upon that of its parent. It is used principally in the colour and paper-making industries.

Artificial Peroxides

In addition to barium peroxide the principal chemicals in this class are sodium peroxide and hydrogen peroxide. The first is principally used as a source of the second, which is of great importance in surgery for washing wounds, and also for bleaching. A noteworthy example of its use is furnished by the straw plait industry. The manufacture of hydrogen peroxide has been largely developed and further plant is being installed. Future developments should be in direction of the manufacture of the quality of high strength, which can now be procured only from the Continent.

Acid Derivatives of Aromatic Hydrocarbons

Important substances comprised within this heading are tricresyl phosphate and tri-phenyl phosphate, which are required for the preparation of aeroplane dope. Before the war they were obtained from abroad, but their supply became of urgent necessity, and consequently plant was installed in this country, and they are now manufactured in large quantities.

Saccharin

This is a synthetic sweetening material possessed of no food value. Very little was made in this country before the war, but owing to its requirements for conserving the sugar supply, the manufacture was taken up to such an extent that the country is now self-supporting. The principal problem remaining to be

solved is the economical utilisation of the low strength sweetening materials obtained in its manufacture.

Analytical Reagents

Before the war analytical reagents were obtained almost entirely from Germany—the firms of Kahlbaum and Merck being the best known and having a wide reputation. For chemical analysis and research it is essential that reagents should be of the highest degree of purity, and on the outbreak or war specifications of purity were drawn up by the Institute of Chemistry and the Society of Public Analysts. Certain firms in this country immediately took up the manufacture of the pure reagents which conformed to these specifications, and for some time this industry has been established, and should be maintained. The lines along which developments should be made are in the direction of indicating the nature and percentage of such impurities as are present, and of increasing the range of substances produced.

Cerium Fluoride and Other Rare Earth Fluorides

These fluorides were not made in this country before the war, but owing to their importance their manufacture was begun and progress has been satisfactory both as regards quality and quantity of output. They are used for impregnating the carbons used in electrical flame arc lamps, the use of which raises the candle-power from about 800 to something of the order of 1,800, for the same energy consumption. In view of the importance of arc lamps for various war purposes it is essential that the country should have control of all materials necessary for the production of impregnated carbons.

Chemical Engineering in Gas Works

AT a meeting of the Birmingham Association of Mechanical Engineers on Saturday a Paper on "Chemical Engineering in Relation to Working up By-products of Our Gas Works" was read by Mr. William A. Twine, A.I.C., A.I.Mech.E. (Member), Chemical Engineer, Birmingham Gas Dept.

It was, he said, a special pleasure for one like himself as a member to address them, because he was connected with a branch of engineering which, until the great war, had not been sufficiently recognised in this country; chemical engineering had now proved *to be as essential as civil, mechanical or electrical engineering.* Few people had any idea of the unlimited wealth which was at the disposal of the chemical engineer. The chemical industry was generally looked upon as a nuisance, and not nearly as respectable as the other industries. During the past five years, however, we in this country had learned the power of Germany, and it was largely due to the development of chemical knowledge.

Modern developments in gas engineering had been very largely pioneered by scientists, especially the chemist and physicist, and he believed the successful gas engineers of the future would be those who had made a study of and had experience in chemical engineering, for it would be they whose function it would be to design and erect plant and apparatus required for the carrying out of gas works process.

It was now generally accepted that a modern gas works was a chemical undertaking, and the manufacture of gas, together with the working up of residuals, purely chemical processes. Quantity and quality of gas made, purification, recovery, distillation of ammonia and tar with cyanogen extraction, all called for scientific control, and surely the chemical engineer was the man who was best suited to answer the call, for he would have been trained in such subjects as transportation of solids, liquids and gases, filtration, sedimentation, desiccation, extraction, distillation, evaporation, crystallisation, condensation, cooling and scrubbing of gases, refining of solids and concentration. As a young man he would have received a thorough chemical and physical training, and afterwards he would have spent a year or two in the shops and on different plants and processes.

Birmingham had the largest gas undertaking outside London, and it was generally recognised throughout the world that the Birmingham gas department was always out for progress; there was no corporation or company that could surpass them, while very few in the world could equal them for scientific control, whether it be mechanical, electrical, chemical or even office organisation.

At present they did not work up all their own residuals, but they made sulphate of ammonia and distilled tar from the Mond gas plant, prepared tar for road spraying purposes, with which last year about 300 miles of roads were successfully treated. They also extracted cyanogen from the gas, because it was one of the most objectionable impurities, and for this purpose the corporation had erected the largest Williams extracting process in the world. It consisted of a set of six cast-iron boxes each 25 ft. square by 6 ft. deep, fitted with shelves on which hard spent oxide was laid in different graded layers. The gas, after all tar had been removed, passed up through these boxes and was moistened with water vapour; this extracted certain quantities of ammonia and sulphuretted hydrogen forming ammonium sulphide and polysulphide, which in turn combined with the cyanogen in the gas forming ammonium sulphocyanide, which was a valuable source of supply to the cyanide industry in the extraction of gold from its ores, while it brought a considerable revenue of some thousands of pounds profit every year. Two further plants were being installed.

During the war it was necessary to extract benzol and toluol from gas in order to produce high explosives like picric acid, lyddite, tri-nitro-cresol, tetra-nitro-aniline, tetra-nitro-methyaniline, tri-nitro-toluene, better known as T.N.T., also nitro derivatives of benzene in admixture with ammonium nitrate giving bellite ammonite, roburite, &c.

At the Nechells works they erected the first gas works plant in the country for the extraction of benzol and toluol from coal gas. During the period of the war they recovered about 850,000 gallons of crude benzol which was used in the production of high explosives. The plant was still at work, though not for war purposes; they were extracting benzol, and in a few weeks would be turning out water white motor spirit.

The plant consists of two five-million cubic feet centrifugal gas washers. The gas made on the works was allowed to pass up through the washers, and the oil was pumped to the top of the apparatus, and allowed to run by gravity down, thus extracting from the coal gas part or all of the benzene and toluene as required. The outgoing oil contained about 3·5 to 4·5 per cent. of spirit which was distilled in a suitable apparatus. The crude spirit was again distilled and fractionated, yielding benzol, xylol and toluol; these were afterwards washed with sulphuric acid and re-distilled, giving pure spirit as required by different processes.

At the Saltley works were distilled Mond tar and recovered oils which are used very largely for disinfectants, sheep dip and fuel oil, while the special pitch was made use of in manufacturing tar felt, waterproof paper, briquettes, &c.

A sulphate of ammonia plant was also at work at Saltley, recovering the ammonia from the whole of the Mond gas installation. These produced an excellent salt for which they obtained the highest market price, because it contained 25·5 per cent. ammonia and was free from acidity.

Although they did not at present distil all their ammoniacal gas liquor and tar, he trusted in the no distant future that would be undertaken.

The tendency of Parliaments in the past, said Mr. Twine, in conclusion, had been to discourage and even restrict gas undertakings desiring greater liberty in the manufacture of by-products, with the *result that private enterprise had the opportunity of making very* large profits. Now that chemical engineering had become properly recognised it behoved every town in the country to see to it that either a good price was paid for ammonia, tar and sulphur, &c., or that the corporation ran their own residual works as did Glasgow, Manchester, Coventry, Newcastle and others, the handsome profits from which went towards the relief of rates.

Newcastle Section's Visit to Shipyards

One of the most interesting of the series of visits to industrial concerns arranged by the Newcastle Section of the Society of Chemical Industry took place on Friday, February 6, when about 40 members visited the shipyards and works of Swan, Hunter & Wigham Richardson, Ltd., at Wallsend and Walker-on-Tyne. They were received by several directors and officials of the firm at the offices, after which Dr. J. H. Paterson, research chemist for the firm, and Messrs. Carr and Haddon took them on a tour of inspection. The compressor house was first visited and much interest was shown in the large plant necessary for the pneumatic tools employed in the yard. The boiler shops and engine works were also inspected, after which an exhibition of electric welding was given by Mr. Carr. The firm has made a speciality of this branch of work, and Dr. Paterson had an opportunity of giving practical illustrations of many of the remarks he has made on the subject to the members. Another interesting event was the launch in the Neptune Yard. The party arrived just in time to see the French liner, "Mendoza," 470 ft. long with 58 ft. beam, leave the ways.

Professor Louis, in proposing a vote of thanks to the firm on behalf of the visitors, said it was an exceedingly good thing for men in any profession to be taken out of their ordinary groove and be shown something entirely new. He was certain that if a man working in another branch of industry failed to take away with him some useful information after such a visit it was entirely his own fault. There was nothing better than to be shown how problems different to their own were being tackled by other people. One of the useful lessons of the war was that it had taught engineers and shipbuilders the usefulness of the chemist. The more often chemists and engineers had an opportunity of exchanging views the better it would be for both.

Mr. T. Morison, shipyard manager, in a brief reply, said that they took a great interest in the chemical world, as they had benefited a great deal by the introduction of a laboratory, of which he could not over-estimate the usefulness. He thought the chemist had a wide field before him in the shipbuilding and engineering industries, and he was glad that shipbuilders and engineers were beginning to realise this.

Society of Chemical Industry

Papers at the Manchester Section

MR. JOHN ALLAN presided on Friday, February 6, at a meeting of the Manchester Section of the Society of Chemical Industry when the following Papers were read :—

The Nitro Group in Aromatic Organic Compounds

A Paper on the Estimation of the Nitro Group in Aromatic Organic Compounds, contributed by Messrs. T. Callan, M.Sc.Ph.D., J. A. Russell Henderson, D.Sc., and N. Strafford, described the various methods of estimating aromatic nitro-compounds which had been studied by them. The nitro-compounds had been classified into three groups :—

1. Those involving the reduction of the nitro group by excess of a reducing agent followed by a determination of this excess by a suitable reagent. Of these the better known required the use of titanous chloride (Knecht's method) or stannous chloride.
2. Those involving the reduction of the nitro body and the subsequent titration of the amino body with standard sodium nitrite solution.
3. Those involving various modifications of the Kjeldahl method.

The authors found that although the methods of the first class in which the reducing agent was titanous or stannous chloride gave good results in a very large number of cases, yet in certain cases, notably alpha-nitro-naphthalene, o-nitro anisole, &c., low and discordant results were obtained, this being due to the formations of chlorinated amines. Search through the literature revealed the fact that such simultaneous chlorination and reduction was not uncommon, numerous examples being given since 1875, when it was first observed by Fittig. A study of the mechanism of the reaction showed that only two-thirds of the reducing agent would be required in the extreme case when only the chlorinated and not the unchlorinated amine was formed, and therefore the nitro body apparently tested 66·6 per cent. Hence, the use of titanous chloride or of stannous chloride in hydrochloric acid solution for the analysis of any nitro body might give results which were altogether misleading unless it was definitely known that no chlorinated amine was formed. To avoid the chlorinating action of hydrochloric acid the authors had used titanous sulphate in sulphuric acid solution in place of titanous chloride in hydrochloric acid solution, and in every case examined the reduction had gone smoothly and completely to the amine, even in those cases in which titanous chloride gave entirely misleading results. Thus, alpha-nitro-naphthalene gave 73·8 per cent., 89 per cent., and 95 per cent. under slightly varying conditions with titanous chloride, and 99·9 per cent. with titanous sulphate. Many aromatic nitro bodies could be reduced by means of zinc dust and hydrochloric acid to the corresponding amine, which could then be titrated without previous isolation by means of standard sodium nitrite solution, using starch iodide papers as external indicator, and in a large number of cases this afforded a rapid and accurate method of estimating the nitro group, the method being of special value when analysing wet pastes and press cakes, such as occurred in works practice.

Discussion

Professor KNECHT said he was very pleased to note that by the use of sulphate as a reagent absolutely reliable results appeared to be obtained without the formation of chlorinated amino compounds. He thought the authors of the Paper had rendered a great service to analytical chemistry in bringing the matter forward, as it placed the analyst in the possession of a method which could be used, apparently, indiscriminately for all nitro compounds. Had the authors made any experiments in the use of the chloride in place of the rather fickle sulphate, as possibly equally reliable results might be obtained and the substance be more stable in contact with the air ?

Dr. CALLAN, in reply, said that there had been practically no differences in the experiment to the original method as devised by Professor Knecht, except in the substitution of titanous sulphate. He did not quite agree with Professor Knecht that it was advisable to sulphonate. This involved the use of oleum sometimes for some hours, while nitro anisole could be dissolved and added straight away into the titanous sulphate and the experiment could be completed in 10 minutes.

A New Characteristic for Coal : The Agglutination Curve

Capt. M. S. Sinnatt, M.Sc. (Tech.), F.I.C., in a Paper on this subject prepared by himself and Mr. A. Grounds, B.Sc., A.I.C., explained that the investigation had been carried out under the auspices of the Lancashire and Cheshire Coal Research Association. It was known that if caking coal was mixed with a certain proportion of such finely pulverised inert substances as sand or anthracite, and the resulting mixture carbonised, the coke would not form a coherent button when the proportion of inert material to coal exceeded a certain limit. The limiting proportion of inert substance was a measure of the agglutinating value of a coal. The Paper contained an examination of the influence of the degree of fineness of the inert substance upon the values obtained. It was shown that the degree of fineness of the inert substance was an important factor in the test, and that the caking power of coal might be destroyed by a very small proportion of inert material of a considerable degree of fineness. Curves were quoted showing the proportion of inert material of varying degrees of fineness a particular coal could sustain, and still yield a coherent coke. The curve particularly under consideration varied in form for different coals and had been called the "agglutination curve." The curves for seven Lancashire coals were given. It was suggested by the authors of the Paper that the form of a curve might be an additional means for indicating the type of coke a coal would produce when it was carbonised. They considered that pulverised electrode carbon was one of the most convenient substances to use as the inert substance when carrying out the test.

Capt. SINNATT, in reply to the discussion, said that the exact manner in which the test was carried out was the Standard American Method. Tests were made as to the friability of the coal and considerable pains were taken to secure a complete range of standard meshed sieves. Lancashire coals contained a high percentage of ferrous iron ; practically every Lancashire coal containing a large proportion in the form of ankerites. Experiments had been made with regard to the fusibility of the ashes, but they had not yet reached such a point at which the results could be standardised. The sand used in the test was pure white Calais sand. The electrode carbon used was old electrodes cleaned up. They had not undertaken any experiments of mixing coal and coke. The coal that was used was air-dried.

Papers at the Nottingham Section

AT a meeting of the Nottingham Section of the Society of Chemical Industry the following Papers were contributed :—

A Method of Determining the Lead and Fatty Acid in Lead Oleates

Messrs. Wilkie and Wain, from the laboratories of Boot's Pure Drug Company, dealing with this subject, stated that in the method of Harrison and Watt the neutral lead salts were decomposed by boiling with sulphuric acid, which might require to be prolonged. In this and in other methods there were possibilities of the oxidation of unsaturated fatty acids. The authors had devised a method whereby the whole of the lead salts were dissolved and decomposed in glacial acetic acid, and the oleic acid, &c., extracted from this solution with chloroform. The lead in the aqueous phase might then be determined by any suitable method. They preferred that of Moser in which the lead was precipitated by a known excess of standard iodate, which was determined iodimetrically in the filtrate, and are engaged in adapting this method to the solution in question, with promising results.

Quick Methods in Iron and Steel Analysis

Some interesting notes on the aids to the analysis of iron and steel which are adopted in the laboratories of Ruston and Hornsby, Lincoln, were described by Messrs. Collitt and collaborators.

Mr. Collitt referred to the useful standards and sheets of instructions, issued by the U.S. Bureau of Standards. On account of the occasional want of uniformity in drillings taken from the same sample of iron, and the nature of many of the methods of analysis, such standards were of the utmost importance. This was emphasised by Mr. Archbutt, who also called attention to the standards prepared in this country. Other standards, for volumetric work, are also issued by the U.S. Bureau, among them sodium oxalate, which has been proved to be one of the best permanganate standards.

The Nesbitt absorption bulb, exhibited on the same occasion and described by Mr. J. Davidson, was a useful accessory in the steel works laboratory. By means of a special stopper, the gases coming from the combustion of molten steel in oxygen were passed downwards through an absorbent mass of ascarite (a special preparation of alkali), through glass wool and out through an exit in the neck which was at nearly the same level as the entrance tube. The carbon dioxide and also the water produced by the absorption of this were quickly taken up so that a very rapid current of oxygen might be used, and a combustion completed in six to ten minutes. One filling sufficed for over 250 combustions.

International Convention Patents

A Swedish Royal Decree of December 19, 1919, extends till July 1, 1920, the time for lodging an application for a patent in Sweden with priority of date, in respect of any invention for which a patent has been applied for in a foreign state on or after July 31, 1913.

Patents Court Cases

Announcement is made of the grant of licences by the Public Trustee under the Trading with the Enemy Acts, 1914-1918, to Dwight & Lloyd Metallurgical Co. and Burma Mines, Ltd., in respect of the following patents : 17,343, 17,344 and 25,985 of 1907 (A. S. Dwight and another) ; 29,779/1909 (F. von Schlippenbach) ; 23,038/1911 (J. Gayley) ; and 5,189/1915 (Metallbank und Metallurgische Ges.). All these relate to roasting and sintering ores.

Newcastle Chemical Club

Dinner to the Founders

On Monday evening, in the Refectory, Armstrong College, about 60 members of the Newcastle Chemical Industry Club were present at a dinner given in honour of the two founders of the club, Dr. F. C. Garrett, Armstrong College, and Mr. A. Trobridge (A. Trobridge & Co.), who has just returned from a trip to Brazil. Professor P. P. Bedson presided, and Mr. H. Dunford Smith was in the vice-chair. Letters of apology for absence were recorded from several members, including Professor Henry Louis.

Professor Bedson said he was extremely proud to have been asked to preside at the first dinner of the Chemical Club. He was very glad they had taken the opportunity to honour Dr. Garrett and Mr. Trobridge at their first dinner. The success of the club was due to the initiative of Dr. Garrett and the work of Mr. Trobridge. When the project was first mooted two years ago he never thought it would so quickly develop into the useful institution that it had proved to be.

Dr. J. H. Paterson, in proposing the health of Dr. Garrett in a neat and humorous speech, referred to his association with Dr. Garrett as an old student. Dr. Garrett had always been an adept at organising those things which dealt with the social life of his students, and if there had been nothing but the formation of the club to his credit he had earned the gratitude of the local industrial chemists, but there were many other excellent reasons why Dr. Garrett should be honoured by chemists, and he had no need to go into them there.

Dr. Garrett, in replying, confessed that one of his peculiarities was the knack of inducing other people to do the work of schemes which he himself only suggested. A great deal of the success of the club was due to the work of Mr. Dunford Smith and Mr. W. Jones. Mr. Smith was the ideal committee man. The success of the club had been most gratifying; they had now 152 members, and could pay their way. He was now entering into his twenty-fifth consecutive session at Armstrong College, and during that time had done many things and attempted many more, but if the founding of the club was the only thing he had done he felt that his time in Newcastle had been well spent.

Mr. H. Dunford Smith, in proposing the health of Mr. Trobridge, described him as a young old man or, alternatively, an old young man. Many of them knew him in commerce and industry, some in chemistry, and others knew him on fishing excursions. They were glad to welcome him back from Brazil. They all knew that the idea of the club was Dr. Garrett's, but, as he had himself confessed, it would not have been a success without the assistance of Mr. Trobridge. He hoped they would have him with them for many years as secretary.

Mr. Trobridge, in replying, described his experience in Brazil, and said that it was a revelation to him that there were communities so absolutely independent of the outside world as some of those in San José. The only imported articles he had seen were two glass tumblers and some enamel ware. He referred to the excellent work done in his absence by Mr. W. Jones, the deputy secretary, who had made the club a success. He was convinced the existence of such an institution, which drew them all together, had tended to greater efficiency in the chemical industry of the district.

Dr. H. Peile proposed the President and the Chemical Industry Club. It was 40 years ago since he had first come under the influence of Professor Bedson, and he was glad to have an opportunity of acknowledging the many kindnesses he had received at his hands. He agreed that the club had been of great service to the chemical industry on Tyneside.

Prof. Bedson briefly replied, and mentioned that he had been 38 years in Newcastle now, and could not help regarding himself as a Northumbrian. He spoke of the kindness of the Newcastle people towards him during that period, and mentioned how delighted he was to see so many of his old students whom he had trained to walk in chemistry now walking unaided and with distinction. He appealed to them to attempt to double and even treble the membership of the club, so that they might move to still better quarters. He thanked them for their kind expressions, and assured them that all he had done for the furtherance of the movement had been a pleasure to him. (Applause.)

Mr. G. Weyman proposed the health of the deputy secretary, Mr. W. Jones, who replied that the success of the club was due to the team work of the members.

Mr. J. Y. Reed proposed the toast of Armstrong College, and referred to the great work which had been done by the College. The future of industry lay with applied science, and he hoped that still greater developments in that direction would be made at Armstrong College. Mr. Robinson replied.

Mr. O. Smalley proposed the toast of the chairman, vice-chairman and artistes.

The Bath Corporation Committee have appointed a special sub-committee to consider the development and commercial possibilities of the discovery made by Mr. G. Provost for tinting glass by the spa mineral waters.

Applied Science in Gas Warfare

Lecture by Lieut.-Col. Lelean

In our issue last week we reported the proceedings at the distribution of prizes at the Sir John Cass Technical Institute on February 3. The prizes were distributed to the successful students by Lt.-Col. Lelean, R.A.M.C., who afterwards delivered a lecture dealing with the evolution of the gas mask as used by our troops, from the cotton wool pad to the well-known box respirator. This, however, we were obliged to hold over until now owing to pressure on our space.

Colonel Lelean opened with a reference to the first occasion on which the Germans had used poisonous gas (April 23, 1915), and the havoc it wrought amongst our men in the trenches, which was not, however, apparent to the enemy, thanks to the presence of mind of one of our officers. In the light of that attack, however, the effectiveness of the new weapon was revealed, and the War Office immediately turned to the Medical Service for help.

The R.A.M.C. College at once commenced research, with a view to providing protection. The organisation, which had to be developed at such speed, was enormous. At the cloth factory the workers were at work day and night, and chemicals had to be located, purchased and assembled. Within 60 hours of the commencement of operations, however, 98,000 pads, consisting of cotton wool sewn in muslin, soaked in a solution, were in the front line available for issue, and within a month over two million had been supplied.

These pads, although they offered a considerable amount of protection, did not meet the situation, because of the uncertainty as to how much chlorine (which was the only gas provided for) the enemy had at his disposal, or whether he would use any other gas. If the attack was renewed with a strange gas the defence would be absolutely useless.

Further experiments were, therefore, carried out, resulting in the production of a helmet (known to our troops as the P.H. helmet) which was effective against a variety of gases.

Much difficulty was experienced in connection with the choice of a substance for eyepieces, and after trying various materials it was finally decided to use glass .

Tests as to the efficiency of these helmets and subsequent inventions were carried out at first on rats. If they stood the test for an hour a pig was subjected to the test. If the pig survived for an hour a human being had to go into the lethal chamber.

By May 10, 300,000 of these helmets, in addition to pads, were issued, and had proved very successful.

Later the enemy resorted to the use of lachrymator gases, which were so effective that the minutest trace on the eyes incapacitated a man within two minutes and rendered him incapable of effective rifle fire. As this passed through the helmet practically without resistance it became necessary to invent some further device and goggles were provided which could be worn inside the helmet so that the vision could be maintained.

A further improvement to the helmet as then made was the provision of a valve through which the expired air was liberated.

The latest development was the tower respirator, known as the small box respirator. In this case the gas-laden air entered the containers through a valve at the bottom. After filtration the air passed through a tube connected to the mask, which was fitted with the old respirator valve, through which the wearer blew out his expired air. The mask was also provided with goggles; so that the wearer was protected against any gas that the enemy had ever used and in any concentration ever likely to be met with.

In conclusion, Colonel Lelean paid a glowing tribute to Colonel Harrison and the staff of officers at the R.A.M.C. College, who had so cheerfully risked their lives by entering the lethal chamber in order to test the helmets and respirators in the various gases. His greatest difficulty was to decide the rival claims of those officers as to who should be allowed to take the risks.

At the conclusion of the meeting a hearty vote of thanks was accorded to Colonel Lelean.

The National Council and Executive of the National Association of Industrial Chemists paid their first official visit to Middlesbrough on Saturday, February 7. Mr. A. C. J. Charlier, president, said he was proud of the Middlesbrough section, as they were now, he believed, the largest section in the country. In some respects they had had to follow the example of the manual grades of workers in order to see that they got their rights, and some of the chemists had even joined the Steel Smelters' Union. Their organisation, however, was growing very rapidly. Their profession was to-day overcrowded, and they had too many so-called industrial chemists in the country. The Government were also making things worse by giving ex-service men three months' training and then telling them to take up positions at the great works. Universities and technical schools had too great a tendency to rush boys into their profession without considering whether they had any special capabilities for it, while many of their members had worked hard for years in studying and had then gone into the works, and yet they were receiving wages below those of street sweepers.

From Week to Week

LORD LEVERHULME has purchased water-front property at Vancouver, B.C., at a cost of £40,000, for the erection of a large soap factory.

THE DEATH OCCURRED ON SATURDAY of Mr. W. W. Fisher, public analyst for the counties of Berks, Bucks and Oxon, and Addrichian Demonstrator in Chemistry in the University of Oxford since 1873.

MR. JOHN SMITH, of Vernon Road, Edgbaston, has established a prize in the University of Birmingham to commemorate the valuable contributions by Professor Thomas Turner to the science of metallurgy.

HUNTINGTON, HEBERLEIN & CO., LTD., announce that in future all communications should be addressed to them at 18, Iddesleigh House, Caxton Street, Westminster, London, S.W.1. (Telephone: Victoria 2554).

NEARLY HALF A TON of gelignite, the property of Messrs. Kynoch, was stolen from a vessel at Arklow, County Wicklow, on Thursday night, February 5. Although the district has been searched by policemen and soldiers no trace of the explosive has been found.

A REUTER'S MESSAGE from Havana, states that on Saturday, February 7, the building of the American Agricultural Chemical Co. was destroyed by fire. The loss is estimated at well over £1,000,000. The fire started in the American wooden steamer, "Brookland," which was lying at the pier, and which burned to the water's edge.

THE HEADQUARTERS of the Profiteering Act Department of the Board of Trade have been removed from 1, Queen Anne's Gate Buildings, S.W., to 22, Carlisle Place, Westminster, S.W., and all future communications should be sent to the new address. Telephone: Victoria 4173. The Central Committee under the Profiteering Act remains at 54, Victoria Street, Westminster, S.W.

IT IS UNDERSTOOD that a London syndicate are negotiating for the purchase of the Atlantic Patent Fuel Works, Swansea, the shareholders in which are being offered £60 for the original £10 shares. The purchase price is said to be about £225,000. The Atlantic Works, which produce about 1,000,000 tons of patent fuel a year, were established over 40 years ago, and in 1878 the concern was sold to the present company.

THE EVIDENCE TAKEN by the Government Departmental Committee appointed by the Board of Trade under the chairmanship of Sir Lionel Phillips "to investigate and inquire into the economic possibilities of the whole of the non-ferrous mines of the United Kingdom" has been completed, and the committee will, it is stated, now consider the framing of its report, which will not be published for several months. An interim report dealing with the Cornish tin mines will, however, be issued at the end of the month.

A PAPER ON "The Manufacture of Glue in the Tropics," by Mr. K. C. Srinivasan, of the Department of Industries, Madras, describes the investigations carried out by the department with regard to the difficulties of manufacturing glue in warm countries, and claims that by a study of the chemical principles involved, and by laboratory and factory experiments, the details of manufacture have been successfully adapted to the climatic conditions prevailing even in the hottest parts of India.

THE MEETING of the Royal Astronomical Society on Friday, February 6, was devoted to a discussion of the practicability of sinking a very deep shaft as suggested by Sir Charles Parsons, and of the scientific advantages to be derived from it. Sir Charles Parsons said that in the Morro Velho mine in Brazil, which has a vertical depth of 6,426 ft., the temperature of the rock at the bottom was 116 deg., and of the air 98 deg. An ammonia refrigerating plant is now being installed to cool the air. He spoke of the possible use of liquid air for cooling purposes.

THE *Yorkshire Post* of Thursday, February 5 published the views of several eminent men on the proposal made by a special committee of the Manchester Chamber of Commerce that the dye industry in this country should be subsidised by the State. Among the opinions quoted are those of Mr. J. E. Bedford and Mr. Charles S. Bedford, of Wood & Bedford, manufacturing chemists, Leeds; Mr. Philip Marsden, chairman of the Yorkshire Indigo, Scarlet & Colour Dyers, Ltd., a member of the Council of the Colour Users' Association; Mr. J. Buckle, of Crossley & Co., Victoria Dyeworks, Bradford; and Mr. J. R. Denison, of J. R. Denison & Co.

AT A RE-UNION, last week, of the workpeople of the Hull Oil Manufacturing Co. it was stated that half the castor oil required for aeroplanes was made by the firm. At a critical period in the war the Government made representations to the firm concerning the fact that at high altitudes castor oil congealed and consequently did not run into the bearings of engines, with the result that the engines got red-hot, and in 15 instances airmen had been killed. Mr. A. W. MacIlmaine, managing director, said that the company's chemists found a solution to this problem and were able to alter the nature of castor oil to such an extent that, while still retaining its lubricating properties, it would not congeal. The firm had subsequently delivered some 5,000 tons of that oil to France without a single complaint.

MR. F. H. CARR, F.I.C., has been elected a director of The British Drug Houses, Ltd. After holding for several years the Salters' Research Fellowship, first at the Pharmaceutical Society's Research Laboratory and afterwards at the Imperial Institute, where he specialised on the active principles of drugs and became a leading authority on Alkaloids, Mr. Carr was appointed chief of Burroughs, Wellcome & Co.'s Chemical Department. In 1914 he was appointed a director of Boots' Pure Drug Company, from which position he resigned at the end of the war.

IT IS ANNOUNCED that owing to the necessity of a long absence in Canada, Colonel W. Grant Morden, M.P., has retired from the chairmanship and board of the British Cellulose and Chemical Manufacturing Company, Ltd., and Sir Harry McGowan has been elected chairman of the board. Sir Philip G. Henriques and Brigadier-General William Alexander have become directors, representing his Majesty's Government, and the following gentlemen have been added to the board:—Sir John Field Beale, Sir Henry Birchenough and Mr. Arthur Chamberlain.

UNDER the presidency of Professor A. G. Perkin, the students of the Leeds University Dyeing Department held a re-union dinner at the Hotel Metropole, Leeds, on Friday, February 6. Professor Perkin, in proposing success to the Department, referred to the decline in the number of students which had been experienced at one time, and said that it was due to the opportunity which dyeing firms previously had of availing themselves of the expert services of so-called "travelling chemists" sent out by foreign dyewares manufacturers. The advantages of that system had now gone, and the students in the dyeing industry were more numerous than ever before.

THE BOARD OF TRADE have appointed a Committee, under the chairmanship of Sir Thomas Bell, to advise what conditions should be complied with in order to prevent danger of fire, including fire resulting from collision, in the case of passenger ships burning oil fuel, and what special precautions, if any, are necessary in the case of oil fuel with a flash point as low as 150°F. The secretary to the Committee is Mr. G. C. Ager, of the Board of Trade, and any communications with regard to the work of the Committee should be addressed to him at the Board of Trade, Great George Street, Westminster, S.W. 1.

THE FOLLOWING is the personnel of the Committee to consider the question of the All-India Chemical Services: President—Professor J. F. Thorpe, Professor of Organic Chemistry in the Imperial College of Science and Technology, London. Members—Dr. K. C. Caldwell, Principal, Patna College; Mr. R. W. Davies, District and Sessions Judge, North Arcot, Madras Presidency; Dr. W. Harrison, Imperial Agricultural Chemist, Research Institute, Pusa; Sir P. C. Ray Palit, Professor of Chemistry, University College of Science, Calcutta; Dr. J. L. Simonsen, Forest Chemist, Forest Research Institute and College, Dehra Dun; Dr. J. J. Sudborough, Professor of Organic Chemistry, Indian Institute of Science, Bangalore. Dr. Simonsen will also be secretary to the Committee.

THE OVERSEAS TRADE DEPARTMENT is now preparing for publication manuals or handbooks of commercial information relating to various countries. These publications, which are intended to be books of reference for British traders, give the stable features of the country described—resources, products, commercial treaties and law, transport, trading methods. The manuals for France and the Argentine are nearly ready, and some material has been accumulated for those on Brazil, Italy and Greece. The Department is also preparing to issue periodic reports sent in by commercial diplomatic officers on instructions issued last year. These are to take the place of the old Consular reports, which were issued periodically from 1858 until the war, but will be a systematic survey of each of the principal countries as a whole.

IN THE COURSE OF A LECTURE on "The Imperial Aspect of Chemical Science," delivered last week in the Lecture Theatre of the Royal Dublin Society, Sir William Pope said that the vast expansion of the experimental sciences which took place at the opening of the last century led to an entire change in the outlook of mankind upon the external world. It was safe to predict that before the middle of the twentieth century men and goods would be transportable between any two points of the earth's surface in less than 24 hours. One of the consequences of scientific knowledge was that, whilst the average expectation of life had been doubled during the initiation of the scientific era of medicine, it was safe to premise that within another short period it would be doubled again. The cultivation of chemical science was of great importance to an Empire which had to administer tropical colonies in which a host of indigenous diseases had in the past impeded colonisation. One of the most striking aspects of chemical science was presented by the great question of the provision of nitrogen compounds, the need of which would be much greater in the future. Germany did not go to war until she had made herself independent of Chile saltpetre as a raw material, and neglect of the imperial aspects of certain great branches of chemical science had led us to the brink of disaster. Thirty per cent. of American casualties in Europe were due to chemical warfare, which it was certain would become one of the main factors in future struggles, and this would be so perfected as to render warfare catastrophic to the less well prepared of two adversaries.

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CONDENSERS. On condensers. F. Friedrichs. *Z. angew. Chem.*, January 27, 29-32. Various types of laboratory condensers have been tested comparatively and their advantages and limitations are discussed.

FATS. Porgress in the chemistry of fats in 1918. W. Fahrion. *Chem. Umschau.*, December 10 and 25, 209-211, 221-223. The analytical and technical chemistry is reviewed.

GAS. Water-gas production in horizontal retorts. Goffin. *J. Gasbeleucht.*, December 6, 729-731.

Gasification of brown coal. R. Geiperk. *J. Gasbeleucht.* December 13, 742-744. The results of several trials are given.

GLASS. Proposals for the standardisation of the shape of chemical glassware. H. Thiene. *Z. angew. Chem.*, January 20, 18-20.

MEDICINES. Important medicinal products of the last four years. J. Messmer. *Z. angew. Chem.*, December 23 & 30, 381-385, 393-396. A description of the principal innovations in synthetic drugs.

MINERAL OILS. The mineral oil industry in 1916-1918. R. Kissling. *Chem. Zeit.*, December 20, 23 & 25, 897-899, 905-909, 913-917. The literature on the production, treatment and technology is reviewed.

PERFUMES. The principles of the chemistry of odorous substances. L. Ruzicka. *Chem. Zeit.*, January 31, 93-94.

PHYSICAL CHEMISTRY. Review of the progress of physical chemistry in 1919. W. Herz. *Chem. Zeit.*, January 20, 24, & 31, 61-62, 74-76, 94-96.

POISONING. Industrial poisoning. Koelsch. *Z. angew. Chem.*, January 6, 1-5. An interesting paper dealing with the various types of industrial poisoning.

PUMPS. Automatic mercury air pump. Von Friedrichs. *Chem. Zeit.*, January 29, 90. A simplified Sprengel-Boltwood pump is described.

RETORTS. Retort coverings. P. M. Grempe. *J. Gasbeleucht.*, December 6, 734-735. The various types of retort coverings particularly carborundum, are discussed.

STAINS. Removal of ink stains. Gerhardt. *Z. angew. Chem.*, January 27, 32.

STANDARDISATION. Standardisation of metals and alloys. *Metall. u. Erz*, December 22, 591-600. Suggestions for standard brasses, bronzes, and other copper alloys are offered.

Standardisation of chemicals and other products. H. Stadlingen. *Chem. Zeit.*, January 22, 69-70.

TAR. The resinous constituents of coal tar. J. Marcusson. *Z. angew. Chem.*, December 23, 385-387.

THIOCYANOGEN. Studies on free thiocyanogen. E. Söderbäck. *Annalen*, December 9, 217-322. The preparation and properties of thiocyanogen and a number of its compounds are described.

VISCOSIMETRY. The measurement of viscosity. O. Faust. *Z. physik. Chem.*, December 9, 758-761. The influence of varying conditions (diameter of tube, &c.), on numerical results has been studied.

WOOD. The chemical composition of alder wood. C. G. Schwalbe and E. Becker. *Z. angew. Chem.*, January 13, 14-16.

Miscellaneous

ANALYSIS. Determination of the composition of mixtures of alcohol and water by electrical conductivity measurements. I. M. Kolthoff. *Rec. Trav. Chim. Pays-Bas*, January 15, 125-134.

A very sensitive reaction of cobalt. J. Bellucci. *Gazzetta*, January 20, 294-298. Observations on the reaction of cobalt with α-nitroso and β-naphthol.

Determination of cyanate, cyanide and bromide when present together. G. Velardi. *Gazzetta*, January 20, 317.

AUTOCLAVES. Heating autoclaves by means of tar oil. F. Meller. *Chem. Weekblad*, January 24, 34-35. An illustrated description of tar-oil burners for heating autoclaves.

CHLORINE. The chlorine industry. A. E. Bonna. *Schweiz. Chem. Zeit.*, Nos. 39-41, 385-389. An illustrated account of the electrolytic manufacture of chlorine and the liquefaction of the product.

COPPER. The electrolytic refining of copper. K. Wiss. *Schweiz. Chem. Zeit.*, Nos. 33-34, 313-318.

FERTILISERS. Notes on Sardinian guano. M. Giua. *Gazzetta*, January 20, 246-249.

Patent Literature

We publish each week a list of selected complete specifications accepted as and when they are actually printed and on sale. In addition, we give abstracts within a week of the specifications being obtainable. Readers can thus decide what specifications are of sufficient interest to warrant purchase, the only way of obtaining complete information. A list of International Convention specifications open to inspection before acceptance is added, and abstracts are given as soon as possible.

120,381-3-4-5. AROMATIC ARSENICAL COMPOUNDS. The Rockefeller Institute for Medical Research, 66th Street, New York. Assignees of W. A. Jacobs, 430, Homestead Avenue, Mount Vernon; W. H. Brown, 6, Cedar Court, Flushing, Long Island; M. Heidelberger, 142, West 91st Street; and L. Pearce, 100, East 17th Street; all in New York. International Convention date (U.S.A.), October 3, 1917.

120,381. Aromatic arsonic acids containing an *a*-aminoacylamide group NH.CHR.CONR'R", where R may be hydrogen, alkyl, or aryl, and R', R" may be hydrogen, benzyl, or substituted benzyl, are prepared by the following methods: (1) *p*-aminophenylarsonic acid or its isomers, homologues, substitution products or salts, is treated with an *a*-halogenacylamide; (2) esters of phenylglycine arsonic acids are treated with ammonia or an amine. As examples, the production of phenylglycinamide-*p*-arsonic acid and its *a*-phenyl derivative are described, as well as other products analogous to these.

120,383. The preparation of aromatic arsonic acids containing an *a*-aminoacylarylamide group, NH.CHR.CONR'R", where R may be hydrogen, alkyl, or aryl, and R', R" may be hydrogen or aryl, is described by two methods: (1) *p*-aminophenylarsonic acid or its homologues, isomers, or substitution products is treated with an *a*-halogenacylarylamide; (2) an ester of a phenylglycine arsonic acid is treated with an arylamine. The preparation of phenyl-glycinanilide-*p*-arsonic acid and analogous substances is fully described.

120,384. The arsonic acids described in 120,381-3 above are treated with a mild reducing agent, such as sulphur dioxide and hydriodic acid to produce aromatic arsenoxides containing an *a*-aminoacylamide group, NH.CHR.CONR'R", where R, R' and R" may be hydrogen alkyl or aryl. Alternatively, aminophenylarsenoxides may be treated with *a*-halogenacylamides. Examples of the preparation of various products are given.

120,385. The arsonic acids or arsenoxides described in 120,383-4 are treated with a strong reducing agent, such as hypophosphorous acid and hydriodic acid to produce arsenoaryl compounds containing an *a*-aminoacylarylamide group in each aromatic nucleus. Various examples are given. All the above compounds are intended for medicinal purposes.

120,546. AMMONIA FROM ATMOSPHERIC NITROGEN, PROCESS AND APPARATUS FOR THE PRODUCTION OF: General Chemical Co., 25, Broad Street, New York (Assignees of F. W. de Jahn, 25, Broad Street, New York). International Convention date (U.S.A.), November 3, 1917.

The process comprises four distinct steps: (1) Producing a gas mixture of nitrogen, hydrogen, and carbon monoxide; (2) Converting the carbon monoxide into an equal volume of hydrogen; (3) Compressing the mixture to 1,400 lb. per square inch, and removing all gas except nitrogen and hydrogen; (4) Subjecting the compressed gas to catalytic action. The mixture of nitrogen, hydrogen, and carbon monoxide is obtained from a gas producer by passing air and steam through red-hot coke, the temperature of which is maintained by intermittent blasts of air. The proportions of air and steam are adjusted so that the resulting gas contains one quarter of its volume of nitrogen. The gas is passed through purifiers and dryers to remove sulphur and water, and is then passed together with steam through an apparatus containing an iron oxide catalyst, by which the carbon monoxide is converted into dioxide and an equal volume of hydrogen. The gas is then compressed to 1,400 lb. per square inch, and is then washed with water and with hot caustic soda to remove the carbon dioxide and any other impurities. The gas passes through a condenser to remove water, and then through finely divided ammoniacal cuprous carbonate solution which is contained in a tower packed with coke, to remove any oxygen or carbon monoxide. The gas is passed through further absorption towers to remove carbon dioxide and moisture, leaving an anhydrous mixture of nitrogen and hydrogen in the approximate proportions of 1 to 3. The gas mixture under pressure is preheated and passed over an iron-sodium-nitrogen catalyst which effects the combination of nitrogen and hydrogen, producing about 8 per cent. by volume of ammonia. The ammonia is separated and the uncombined gas is returned for further treatment. The accumulated rare gases (argon, helium, &c.) are periodically removed from the system. A special process is adopted for preparing the cuprous carbonate to avoid corrosion of metallic vessels by traces of acid in the substance. Strong aqueous ammonia is saturated with ammonium carbonate, and the solution circulated on copper filings and oxygen or air passed through it till the liquid contains about 2·5 per cent. of copper in a cupric state. The air or oxygen is cut off and nitrogen substituted till the copper content rises to about 5 per cent., *i.e.*, in a cuprous state. The resulting solution is used for absorbing the carbon monoxide. The whole process and the apparatus used are described in detail.

126,951. METALLURGICAL REDUCTION PROCESSES. Norsk Hydro-Elektrisk Kvaelstofaktieselskab, Christiania, Norway. International Convention date (Norway), May 15, 1918.

Ores are reduced by carbon monoxide which is obtained from carbon dioxide by the following method. Sulphide of iron, molybdenum, zinc, &c., is heated to about 600°C., or higher, and carbon dioxide is passed through it. The sulphide is converted into oxide and a mixture of carbon monoxide and sulphur dioxide is formed. The sulphur dioxide is removed by passing the gas through scrubbers, and the carbon dioxide passes into a gas-holder and thence to the chamber containing the heated ore which is to be reduced. The carbon dioxide from the reduction process is then converted into monoxide as above. This process renders it possible to effect the reduction of ore without the use of coal or similar fuel.

137,080. FERRO-ALLOYS, PRODUCTION OF. H. L. Sulman, 44, London Wall, London, E.C.2, and W. B. Ballantine, 62, Pall Mall, London, S.W. Application dates, July 2 and November 23, 1918.

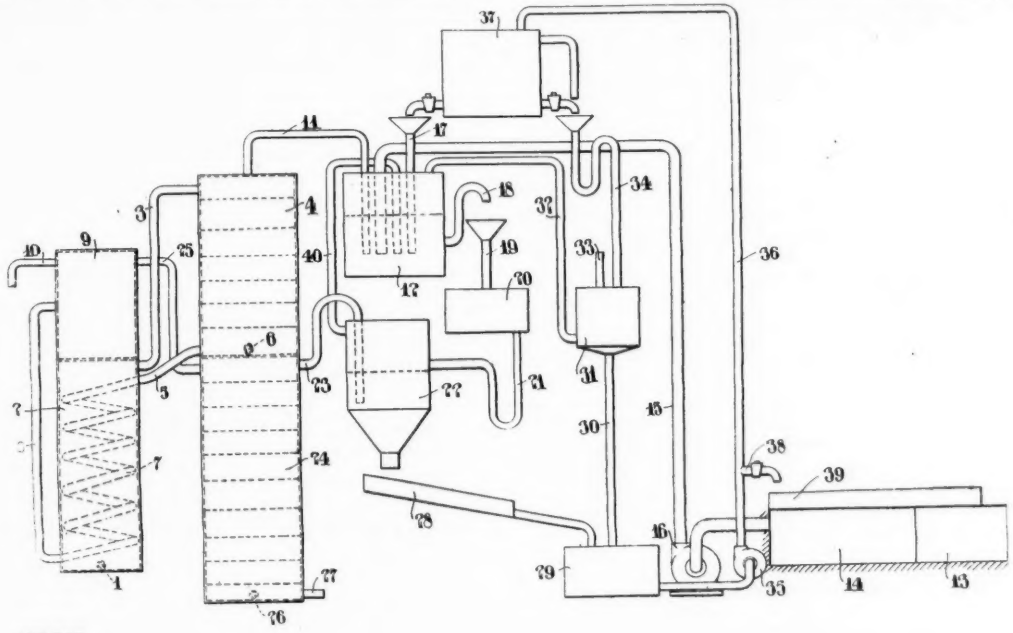
The process is for the production of ferro-alloys containing chromium and tungsten. Chromium di-tungstate is precipitated from sodium tungstate by a solution of chromium sulphate or chrome alum. This compound is then mixed with a thermo-reducing agent, such as powdered aluminium, and ignited to produce an alloy of chromium and tungsten. If the proportion of these two metals is not that finally required, any additional quantity of one of them is added in combination with another metal of the alloy, *e.g.*, iron, or alternatively, the addition may be made in the form of a compound such as the oxide, uncombined with another metal. As an example, tungsten may be added in the form of ferrous tungstate, which is also reduced by a thermo-reduction process. The production of the alloy from chemical compounds of the ingredients facilitates the elimination of silica, and the process is also applicable to non-ferrous alloys.

137,149. COKE OVEN DOORS, BARS FOR SUPPORTING. J. Morrison, 6, Chappel Street, Shuttles, Low Teams, Gateshead. Application date, February 14, 1919.

The object is to provide a locking bar for securing coke oven doors more effectively. The vertical girders on either side of the door are provided with brackets, attached by a bolt passing through the holes through which the locking bar usually passes. The bar is made with a short T-piece at each end, but projecting more on one side of the bar than on the other. The ends of the bar are supported on the brackets and a variable pressure may be exerted against the oven door by rotating the bar into various positions.

137,345. AMMONIUM SALTS, PRODUCTION OF. W. S. Curphey, 87, Canfield Gardens, London, N.W.6. Application date, August 21, 1918.

The object is to produce ammonium salts such as the sulphate or the mixed sulphite and sulphate (Burkeiser salt), from crude ammoniacal liquor. The crude liquor is first heated to drive off a part of its ammonia and impurities, such as sulphuretted hydrogen, carbon dioxide, and volatile organic matter. This gas is passed through sulphuric acid free from sulphurous acid or bisulphites, when ammonium sulphate will be formed and any arsenic present in the acid will be precipitated. The liquor is filtered, and pure ammonia obtained from the residue of the ammoniacal liquor by heating with lime is passed through it, thus producing a pure ammonium sulphate free from sulphur or free acid. Alternatively, the pure ammonia gas from the second stage of the treatment of the gas liquor may be passed through sulphuric acid free from arsenic, or a solution containing sulphurous acid or bisulphites. The crude liquor passes by the pipe 1 into the heat exchanger 2, and thence by the pipe 3 to the still 4, which is heated by steam supplied through the inlet 6. The residual liquor passes back through the coil 7 in the heat exchanger, and thence by the



137,345

pipe 8 to the vessel 9, where it is mixed with milk of lime for the second stage of the process. The gas from the still 4 passes by the pipe 11 to the absorber 12, into which sulphur dioxide from the burner 13 is also forced by the fan 16 and pipe 15. Liquid is introduced by the pipe 17, and the resulting salt solution passes by the pipes 18, 19, to the filter 20, from which the filtrate passes by a pipe 21 to a second absorber 22. The liquor from the vessel 9 passes by the pipe 25 to the second still 24, which is also heated by steam, and the pure ammonia given off passes by the pipe 23 into the second absorber 22. The crystalline salt produced in the absorber 22 is separated by the draining device 28, and the liquor passes into the tank 29, which also receives the wash liquor from the chamber 31, into which the residual gas from the absorber 12 passes by the pipe 32. The absorbing liquor is supplied to the chamber 31 from the tank 37, which also supplies the absorber 12, and the liquor from the tank 29 may be returned to the tank 37 by the pump 35 and pipe 36.

137,388. ACETIC ACID, PROCESS OF RECOVERING—AND MANUFACTURING ACETATES. H. W. Matheson, Shawinigan Falls, Quebec, Canada. Application date, January 23, 1919.

The process is for recovering acetic acid from the hot vapour derived from the conversion tubes in the manufacture of acetone. The mixed vapour of acetone and acetic acid at 350° to 500°C. is passed through scrubbers containing caustic soda solution at 85° to 100°C. The acetone passes through, but the acetic acid is absorbed, forming sodium acetate. The liquor is kept in circulation so that evaporation takes place simultaneously, and the concentrated liquor is then crystallised and separated. The apparatus is duplicated so that the process may be made continuous.

137,396. CITRIC ACID, MANUFACTURE OF. W. J. Mellersh-Jackson, London. From Citro Chemical Co. of America, Maywood, N.J., U.S.A. Application date, January 30, 1919.

Crude calcium citrate is treated with an alkali metal bisulphate to produce sodium citrate, citric acid, and calcium sulphate, and the solution is heated to boiling with the addition of lime to neutralise the free acid and produce calcium citrate. All the citric acid is precipitated as calcium citrate, which is then filtered from the soluble impurities, and the citrate is treated with sulphuric acid to produce citric acid. If the insoluble impurities are also to be removed, the solution after adding bisulphate is filtered to remove the calcium sulphate and impurities, and then heated with lime, and calcium sulphate. The precipitated calcium citrate is filtered off from the soluble impurities and then treated to produce pure citric acid.

NOTE.—Specification 133,304, which is now accepted and published, was abstracted in THE CHEMICAL AGE, when it originally became open to inspection under the International Convention. It relates to aliphatic nitrites. *See* Vol. I., p. 699.

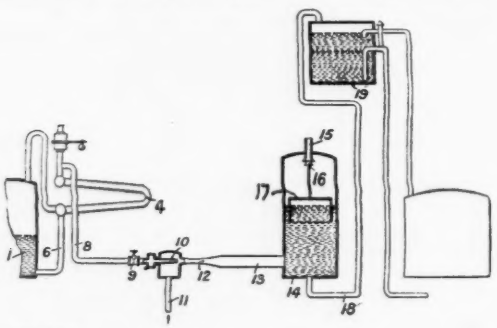
International Specifications Not yet Accepted

135,854. CRACKING HYDROCARBONS. R. Fleming, Swampscott, Mass., U.S.A. International Convention date, November 17, 1916.

Hydrocarbons of low boiling point are produced from hydrocarbons of slightly higher boiling point by prolonged contact under pressure with a heated menstruum whose boiling point is above the cracking temperature of the hydrocarbon under treatment. Gasolene may be produced from burning and gas oils of 45°Bé. and upwards, boiling at 180° to 350°C., in contact with menstrua such as fuel oil or pitch residues of 12° to 20°Bé. boiling above 350°C. To produce benzol, toluol, xylol, &c., from petroleum, deal oil, solvent naphtha, &c., a menstruum of coal tar is used. The still consists of upper and lower chambers connected by vertical tubes heated by furnace gases. The menstruum and hydrocarbon to be cracked are sprayed into the lower chamber, and the cracked vapour is drawn off from the upper chamber to a condenser under pressure.

135,855. CONDENSING AND PURIFYING OIL, ETC., VAPOURS. R. Fleming, Swampscott, Mass., U.S.A. International Convention date, March 25, 1918.

Cracked oil vapour or oil or tar distillate is condensed by water under pressure to minimise the amount of permanent gas. The vapour from the still 1 passes through an air-cooled reflux condenser 4 and the lighter vapour then passes to the jet 10 of an injector. Water under pressure is admitted from the pipe 11 to the mixing chamber 12, and the mixture passes to a chamber 14 for separating the liquid and gas. The liquid



135,855

is forced by the gas pressure to a tank 19 at a higher level, where the oil and water are separated and drawn off as shown. The pressure due to the head of liquid maintains the necessary pressure on the mixture produced by the injector to prevent expansion and consequent loss of material as permanent gas. The distillates may be simultaneously treated for the removal of sulphur, &c., by adding lead oxide or acetate and caustic soda, or a mixture of lime, soda ash and lead salt, or other chemicals to the condensing water.

136,141. CELLULOSE ESTER SOLUTIONS. O. Carlsson and E. Thall, 14, Gotgatan, Stockholm. International Convention date, December 6, 1918.

Solutions of cellulose esters, such as nitrocellulose, acetyl cellulose, celluloid, &c., may have their viscosity permanently reduced by heating them to a temperature between 60°C. and the decomposition temperature of the ester. A greater reduction of viscosity is produced by higher temperatures and longer heating.

136,148. ELECTRIC FURNACES. Soc. Anon. des Ateliers de Sécheron, Sécheron, Geneva. (Assignees of B. Bauer, Zurich, and A. Zeerleder, Berne.) International Convention date, December 6, 1918. Addition to 133,706.

The electrodes of the furnace are each in the form of a ring, one at the top surrounding the top of the crucible, and the other at the bottom, the intervening space being packed with resistance material in contact with the crucible. One or more horizontal layers of insulating material are inserted in the casing which surrounds the resistance material to prevent short-circuiting of the current.

136,151. ELECTROLYSIS. Electrolytic Zinc Co. of Australasia Proprietary, 360, Collins Street, Melbourne. International Convention date, December 3, 1918.

In the electrolytic deposition of zinc, the cathode, which may be of aluminium, is coated with a protecting coating of zinc above the level of the solution. The method of producing the coating and subsequently obtaining the main deposit of zinc are described in detail.

136,158. NITROGEN OXIDES. General Chemical Co., 25, Broad Street, New York. (Assignees of W. W. Scott, Ridgefield, N.J., U.S.A.) International Convention date, September 7, 1918.

The oxidation of ammonia to oxides of nitrogen is effected by employing a catalyst consisting of a mixture of cobalt and aluminium oxides, which is made by evaporating to dryness and then heating a solution of the mixed nitrates or sulphates. Alternatively the mixed oxides or hydroxides may be made into a paste with water and then heated. The temperature at which the salts are reduced to oxides should be below that at which the oxides are to be used for catalysis, *e.g.*, a temperature of 360° to 650°C., would be suitable if the catalysing temperature were 650° to 850°C. The catalyst may be deposited on pumice.

136,163. TREATING ORES. Soc. Anon, Minerais et Metaux, 154, Boulevard Haussmann, Paris. International Convention date, December 3, 1918.

Mixed sulphide ores may be treated with a solution of ferric chloride or manganese chloride which dissolves sulphides, such as those of lead, copper, silver, and gold, forming chlorides with precipitation of sulphur; other sulphides, such as zinc sulphide, are not dissolved. The sulphur may be removed from the zinc sulphide by flotation, or it may be left to facilitate the roasting of the sulphide. The metals in solution may be separated by known means such as precipitating lead by iron or by electrolysis. The resulting ferrous chloride may be treated with chlorine or otherwise oxidised to ferric chloride.

136,169. PURIFYING MINERAL OILS. G. Grisard, 302, Grenzacherstrasse, Basle, Switzerland. International Convention date, December 4, 1918.

Mineral oil which has been treated with sulphuric acid to purify it, is washed with hot water to recover the sulphonic and naphthenic acids and heated to 50° to 70°C., whilst agitating. Dry anhydrous sodium or potassium carbonate, or ammonium carbonate or bicarbonate mixed with calcium chloride or other drying agent is strewn on the surface. The alkali sulphate, excess of carbonate and calcium chloride are allowed to settle, and the oil is then filtered.

LATEST NOTIFICATIONS.

138,317. Filter Presses. Soc. Anon. des Etablissements A. Olier. January 31, 1919.

138,328, 138,329, 138,330, 138,331. Glycerol from sugar, Manufacture of. Vereinigte Chemische Werke Akt.-Ges. April 22, 1916.

138,333-4-5. Blocks and Coke Oven Walls, and the like made therefrom. American Coke & Chemical Co. January 27, 1919

138,354. Electric furnaces, Suspension of Electrodes in. Norske Aktieselskab for Elektrokemisk Industri Norsk Industri-Hypotekbank. January 28, 1919.

138,355. Gas Analysing Apparatus. Svenska Aktiebolaget Mono. January 29, 1919.

138,362. Wood Gas Producer. L. Avellana. January 28, 1919.

Specifications Accepted, with Date of Application

131,293. Crude Paraffin Residue, Process and Apparatus for Producing Cakes of. A. Szekely. May 30, 1918.

137,547. Water Vapour or either of the Gaseous Components Thereof, Method of and Apparatus for Detecting. H. E. F. Goold-Adams, W. R. Bousfield and G. W. Todd. September 28, 1917.

137,553. Electrolytic Apparatus. E. O. Benjamin. August 1, 1917.

137,558. Acetone, Manufacture of—by the Dry Distillation of Pyrolignite of Lime and other Acetates. L. Rappaport. November 19, 1918.

137,572. Low Temperature Destructive Distillation of Coal. J. Swinburne. January 4, 1919.

137,609. Electrolytic Cells. H. W. Matheson and F. T. Kaelin. January 23, 1919.

137,615. Volatile Solvents Evaporated into the Atmosphere, Process for the Collection and Recovery of. L. A. Levy. January 27, 1919.

137,626. Ore Briquettes, Manufacture of. H. G. Hills and E. Wheeler. February 1, 1919.

137,628. Gas-fired Furnaces. J. W. Gaunt and W. and J. Lawley. February 5, 1919.

137,632. Caustic Potash, Manufacture of. C. L. Higgins and United Alkali Co. February 6, 1919.

137,647. Gas Producers. J. West and W. Wild. February 18, 1919.

137,674. Hydrogen Gas, Means for Charging Retorts or Apparatus with Spathic Ore for the Manufacture of. W. J. Bates and W. R. Bates. March 13, 1919.

137,701. Acetic Anhydride, Manufacture of. F. P. Leach and United Alkali Co. April 4, 1919.

137,733. Azo-Dyestuffs and Intermediate Products Therefor, Manufacture of. O. Imray (*Society of Chemical Industry in Basle*). May 12, 1919.

137,750. Sugar Solutions, Process for Defecation of. E. C. R. Marks (*Industrial Apparatus Corporation*). June 23, 1919

Monthly Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co. and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The weekly report contains only commodities whose values are at the time of particular interest or of a fluctuating nature. A more complete report and list are published once a month. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

British Market Report

THURSDAY, February 12.

The demand for all chemicals remains extremely active and prices are advancing all round. It is daily becoming more difficult to fulfil even Home trade buyers' requirements, and in many cases it is extremely difficult to see from what quarter relief can be expected. The majority of manufacturers in this country are well booked ahead, while it is becoming more and more impossible to import goods at reasonable prices from the Continent.

The American rate of exchange also has a retarding influence on imports from the U.S.A., while at the same time raising values. The export demand continues very brisk, though, of course, the actual business concluded is nothing like as great as would be the case if supplies were obtainable.

General Chemicals

ACETONE.—There is a good inquiry for this material, but price is without change.

ACID ACETIC continues very active, and supplies are quickly absorbed as they arrive. The price is very firm and a turn higher.

ACID BORIC is in demand at recent figures, but export orders cannot be entertained.

ACID CARBOLIC is increasingly scarce, and in good demand.

ACID CITRIC is in very active request, but supplies are difficult to obtain, and price is very high.

ACID FORMIC is in fair request at last quoted prices.

ACID OXALIC remains scarce, and very firm. Quotations are nominally without change, although higher figures have been paid this week for spot delivery.

ACID TARTARIC meets with a very fair inquiry both on home and export account, and price is very firm.

AMMONIUM SALTS are all very active, and in most cases manufacturers are fully sold for several months ahead. Muriate and phosphate are higher.

ARSENIC continues in active request, but is very scarce, and price tends to harden.

BARIUM SALTS are in very fair request, without change in values.

BLEACHING POWDER is in steady request, and is moving off well for home trade. It is practically impossible, however, to conclude any business on export account, owing to scarcity of supplies.

CALCIUM ACETATE is scarce and firm.

COPPER SULPHATE is rather quiet, although the undertone is very firm. It would not be surprising if business were possible on the Continent again before very long.

FORMALDEHYDE is practically unobtainable on the spot, and price is nominal.

IRON SULPHATE (GREEN COPPERAS) is without change in price, with a fair inquiry.

LEAD ACETATE is in active request at last quoted prices.

LITHOPONE becomes daily more difficult to supply, and there are very few arrivals.

MAGNESIUM SULPHATE (EPSOM SALTS) is without change in price, and is wanted on export account.

POTASSIUM BICHROMATE continues extremely scarce and high prices are being paid for resale parcels.

POTASSIUM PERMANGANATE is very scarce on the spot, and price is without change.

POTASSIUM PRUSSIATE is without change, and in very fair request.

SODIUM ACETATE is firm, and in very fair demand.

SODIUM BICARBONATE is higher, and is wanted on export account.

SODIUM BICHROMATE is again higher in price for spot delivery.

SODIUM BISULPHITE POWDER is now unobtainable for near delivery.

SODIUM CHLORATE is dull and weak.

SODIUM CAUSTIC has had another jump in price, but even at these higher figures there are plenty of buyers.

SODIUM HYPOSULPHITE is in short supply, but price is without change.

SODIUM NITRITE is very scarce, and price extremely firm.

SODIUM PHOSPHATE is higher, and rather scarce for near delivery.

SODIUM PRUSSIATE is practically unobtainable for near delivery, and price is a shade higher.

SODIUM SULPHIDE is again higher in price for near delivery.

STRONTIUM SALTS are only in fair request.

TIN SALTS are more active.

ZINC SALTS are moving off very well, and prices are without change.

Coal Tar Intermediates

There is nothing of special interest to report, and the position is about the same. Manufacturers show disinclination to quote for forward delivery, and there are very few arrivals of imported material.

ACETANILIDE is again higher and very scarce.

ANILINE OIL is still scarce, but better supplies are anticipated shortly.

ANILINE SALTS can now be obtained for fairly prompt delivery, and price is without change.

BETA NAPHTHOL is unobtainable for prompt delivery, and fancy prices have been reported for odd spot parcels.

BETA NAPHTHYLAMINE is in better request, and several orders have been placed for forward delivery.

NAPHTHIONIC ACID is becoming scarce.

NITRO BENZOL is in very good request both on home trade and export account.

RESORCIN is wanted, but demands are difficult to satisfy.

SALICYLIC ACID is very firm, and prompt delivery cannot now be given.

Coal Tar Products

Many coal tar products have advanced in price during this week.

90 PER CENT. BENZOL is a little stronger, and business has been done at 2s. 7½d. on rails at makers' works.

CRESYLIC ACID is very fully sold. The price is about 3s. 7½d. for pale 97/99 per cent., and 3s. for dark 95/97 per cent. quality.

CREOSOTE OIL.—There is a very strong demand for this article, and the present price is about 9½d. per gallon.

NAPHTHALENE.—There is only a moderate demand but manufacturers are asking £22 to £23 per ton for refined, while crude is worth £7 to £9 per ton, according to quality.

SOLVENT NAPHTHA can be bought in the region of 3s. 3d. on rail makers' works.

HEAVY NAPHTHA.—The price is about 2s. 10d.

PITCH.—The market continues very firm, and business has been done at 117s. 6d. f.o.b. London, while makers ask 110s. to 115s. f.o.b. East Coast, and 100s. to 105s. f.o.b. West Coast.

Sulphate of Ammonia

No business has been done for export, and Home trade prices are unchanged.

French Market Report

There has been a good inquiry from France, but unfortunately owing to the prevailing conditions in this country it has been impossible to conclude a quantity of the business offered.

The exchange has a retarding effect on business, of course, and French buyers seem to still have expectations of receiving cheap chemicals from Germany. Transport has greatly improved, especially on the canals, and we think that a much better business may be expected very shortly.

ACID, ACETIC, is in good demand, and is standing at equal to about £95 per ton.

ACID, FORMIC, is only in fair request, and price is good at about £90 per ton.

ACID, OXALIC, is badly wanted, and the price is rising daily, and is now standing at about 2s. per lb.

ALCOHOL of all grades is in great demand, but it is impossible to supply anything like the quantity called for.

ALUM is wanted, and is equal to about £25 per ton c.i.f.

AMMONIUM SALTS are in good request.

LEAD SALTS have been in much better demand, and prices are equal to about £100 per ton for white.

NAPHTHALINE SALTS are still extremely quiet, but with the clearing of the French stocks there are welcome signs of an improvement.

SODIUM SALTS are all wanted. There is an extreme shortage of caustic, and the price is equal to about £42 per ton. Bisulphite is also badly wanted, and £45 per ton has been paid. Sulphite is also being looked for, and is in good request at equal to £38 per ton.

RESINS.—All grades are very firm, and factories are very averse to accepting orders.

ZINC SALTS are in great request.

German Market Report

Owing to the shortage of fuel the production of German works is very small, and export licences difficult to obtain. Despite the adverse exchange there is a great demand for all mineral oils, fats and greases.

The production of oxalic acid has fallen away, and there is a very great shortage, with no surplus for export.

Small parcels of pharmaceutical chemicals are occasionally to be obtained. Germany Home trade prices are in most cases nominal, but we are not publishing a list of values in this issue.

Current Prices

Chemicals

	per	£	s.	d.		£	s.	d.
Acetic anhydride	lb.	0	3	3	to	0	3	6
Acetone oil	ton	77	0	0	to	80	0	0
Acetone, pure	ton	90	0	0	to	95	0	0
Acid, Acetic, glacial, 99-100%	ton	90	0	0	to	95	0	0
Acetic, 80% pure	ton	75	0	0	to	80	0	0
Arsenic	ton	75	0	0	to	77	0	0
Boric, cryst.	ton	74	10	0	to	76	0	0
Carbolic, cryst. 39-40%	lb.	0	1	3	to	0	1	3½
Citric	lb.	0	4	9	to	0	5	0
Formic, 80%	ton	110	0	0	to	115	0	0
Gallic, pure	lb.	0	7	0	to	0	7	6
Hydrofluoric	lb.	0	0	7	to	0	0	8
Lactic, 50 vol.	ton	65	0	0	to	70	0	0
Lactic, 60 vol.	ton	80	0	0	to	85	0	0
Nitric, 80 Tw.	ton	37	0	0	to	39	0	0
Oxalic	lb.	0	2	0	to	0	2	2
Phosphoric, 1.5	ton	45	0	0	to	50	0	0
Acid, Pyrogallic, cryst	lb.	0	11	6	to	0	11	9
Salicylic, Technical	lb.	0	3	0	to	0	3	3
Salicylic, B.P.	lb.	0	3	9	to	0	4	6
Sulphuric, 92-93%	ton	7	10	0	to	8	0	0
Tannic, commercial	lb.	0	5	0	to	0	5	3
Tartaric	lb.	0	3	7	to	0	3	7½
Alum, lump	ton	19	10	0	to	20	0	0
Alum, chrome	ton	93	0	0	to	95	0	0
Alumino ferric	ton	9	0	0	to	9	10	0
Aluminium, sulphate, 14-15%	ton	15	0	0	to	15	10	0
Aluminium, sulphate, 17-18%	ton	18	10	0	to	19	0	0
Ammonia, anhydrous	lb.	0	1	9	to	0	2	0
Ammonia, .880	ton	32	10	0	to	37	10	0
Ammonia, .920	ton	20	0	0	to	24	0	0
Ammonia, carbonate	lb.	0	0	7½	to		—	
Ammonia, chloride	ton	72	0	0	to	77	0	0
Ammonia, muriate (galvanisers)	ton	50	0	0	to	52	0	0
Ammonia, nitrate	ton	45	0	0	to	50	0	0
Ammonia, phosphate	ton	130	0	0	to	135	0	0
Ammonia, sulphocyanide	lb.	0	1	10	to	0	2	0
Amyl, acetate	ton	360	0	0	to	370	0	0
Arsenic, white, powdered	ton	71	0	0	to	73	0	0
Barium, carbonate	ton	13	10	0	to	14	10	0
Barium, carbonate, 92- 4%	ton	14	10	0	to	15	0	0
Chlorate	lb.	0	1	4	to	0	1	5
Chloride	ton	24	0	0	to	26	0	0
Nitrate	ton	50	0	0	to	51	0	0
Sulphate, blanc fixe, dry	ton	25	10	0	to	26	0	0
Sulphate, blanc fixe, pulp	ton	15	10	0	to	16	0	0
Bleaching powder, 35-37%	ton	18	0	0	to	18	10	0
Borax crystals	ton	41	0	0	to	42	0	0
Calcium acetate, grey	ton	28	0	0	to	29	0	0
Carbide	ton	28	0	0	to	30	0	0
Chloride	ton	9	0	0	to	9	10	0
Carbon bisulphide	ton	58	0	0	to	59	0	0
Casein, technical	ton	80	0	0	to	83	0	0
Cerium oxalate	lb.	0	3	9	to	0	4	0
Chromium acetate	lb.	0	1	0	to	0	1	2
Cobalt acetate	lb.	0	7	0	to	0	7	6
Oxide, black	lb.	0	7	9	to	0	8	0
Copper chloride	lb.	0	1	3	to	0	1	6
Sulphate	ton	50	0	0	to	52	0	0
Cream Tartar, 98-100%	ton	290	10	0	to	295	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde 40% vol.	ton	300	0	0	to	310	0	0
Formusol (Rongalite)	lb.	0	4	0	to	0	4	3
Glauber salts	ton	3	15	0	to	4	0	0
Glycerine, crude	ton	70	0	0	to	72	10	0
Hydrogen peroxide, 12 vols.	gal.	0	2	8	to	0	2	9
Iron perchloride	ton	40	0	0	to	42	0	0
Iron sulphate (Copperas)	ton	4	10	0	to	4	15	0
Lead acetate, white	ton	105	0	0	to	110	0	0
Carbonate (White Lead)	ton	72	0	0	to	74	10	0
Nitrate	ton	80	0	0	to	85	0	0
Litharge	ton	67	0	0	to	70	0	0
Lithophone, 30%	ton	50	0	0	to	54	0	0
Magnesium chloride	ton	15	10	0	to	16	10	0
Carbonate, light	cwt.	2	15	0	to	3	0	0
Sulphate (Epsom salts commercial)	ton	13	0	0	to	13	10	0
Sulphate (Druggists')	ton	18	10	0	to	19	10	0
Methyl acetone	ton	80	0	0	to	90	0	0
Alcohol, 1% acetone	gall.	Nominal.						
Nickel ammonium sulphate, single salt	ton	47	10	0	to	52	10	0
Potassium bichromate	lb.	0	1	10	to	0	2	0
Carbonate, 90%	ton	102	0	0	to	105	0	0
Chloride	ton	Nominal.						
Potassium Chlorate	lb.	0	1	1	to	0	1	2
Meta-bisulphite, 50-52%	ton	250	0	0	to	260	0	0
Nitrate, refined	ton	68	0	0	to	70	0	0
Permanganate	lb.	0	4	9	to	0	5	0
Prussiate, red	lb.	0	6	0	to	0	6	3
Prussiate, yellow	lb.	0	2	1	to	0	2	3
Sulphate, 90%	ton	31	0	0	to	33	0	0
Salammoniac, firsts	cwt.	4	15	0	to		—	
Seconds	cwt.	4	10	0	to		—	
Sodium acetate	ton	54	0	0	to	56	0	0
Arsenate, 45%	ton	52	0	0	to	54	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	1	4	to	0	1	6
Bisulphite, 60-62%	ton	32	10	0	to	33	10	0
Chlorate	lb.	0	0	5¾	to	0	0	6¼
Caustic, 70%	ton	33	10	0	to	35	10	0
Caustic, 76%	ton	34	10	0	to	35	10	0
Hydrosulphite, powder, 85%	lb.	0	3	3	to	0	3	6
Hyposulphite, commercial	ton	21	10	0	to	22	10	0
Nitrite, 96-98%	ton	77	10	0	to	82	10	0
Phosphate, crystal	ton	38	0	0	to	40	0	0
Sodium, Perborate	lb.	0	2	2	to	0	2	4
Prussiate	lb.	0	1	10	to	0	1	11
Sulphide, crystals	ton	18	0	0	to	18	10	0
Sulphide, solid, 60-62%	ton	34	10	0	to	36	10	0
Sulphite, cryst.	ton	12	10	0	to	13	10	0
Strontium, carbonate	ton	85	0	0	to	90	0	0
Nitrate	ton	85	0	0	to	90	0	0
Sulphate, white	ton	8	10	0	to	10	0	0
Sulphur chloride	ton	42	0	0	to	44	10	0
Sulphur, Flowers	ton	25	0	0	to	27	0	0
Roll	ton	24	0	0	to	26	0	0
Tartar emetic	lb.	0	3	6	to	0	3	7
Tin perchloride, 33%	lb.	0	2	6	to	0	2	7
Perchloride, solid	lb.	0	2	9	to	0	3	0
Protochloride (tin crystals)	lb.	0	1	11	to	0	2	0
Zinc chloride, 102 Tw.	ton	22	0	0	to	23	10	0
Chloride, solid, 96-98%	ton	50	0	0	to	52	10	0
Oxide, 99%	ton	77	10	0	to	80	0	0
Oxide, 94-95%	ton	60	0	0	to	62	10	0
Dust, 90%	ton	70	0	0	to	72	10	0
Sulphate	ton	22	10	0	to	23	10	0
Oxide, Redseal	ton	80	0	0	to	85	0	0

Coal Tar Intermediates, &c.

	per	£	s.	d.		£	s.	d.
Alphanaphthol, crude	lb.	0	3	6	to	0	3	9
Alphanaphthol, refined	lb.	0	3	9	to	0	4	0
Alphanaphthylamine	lb.	0	3	6	to	0	3	9
Aniline oil, drums extra	lb.	0	1	5	to	0	1	6
Aniline salts	lb.	0	1	10	to	0	2	0
Anthracene, 85-90%	lb.		—		to		—	
Benzaldehyde (free of chlorine)	lb.	0	5	6	to	0	6	0
Benzidine, base	lb.	0	12	6	to	0	13	6
Benzidine, sulphate	lb.	0	10	0	to	0	11	0
Benzoic, acid	lb.	0	5	6	to	0	6	0
Benzoate of soda	lb.	0	5	6	to	0	6	0
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol benzoate	lb.	1	6	0	to	1	7	6
Betanaphthol	lb.	0	3	9	to	0	4	0
Betanaphthylamine, technical	lb.	0	7	6	to	0	8	6
Croceine Acid, 100% basis	lb.	0	5	0	to	0	6	3
Dichlorbenzol	lb.	0	0	6	to	0	0	7
Diethylaniline	lb.	0	7	9	to	0	8	6
Dinitrobenzol	lb.	0	1	4	to	0	1	6
Dinitrochlorbenzol	lb.	0	1	4	to	0	1	5
Dinitronaphthaline	lb.	0	1	4	to	0	1	6
Dinitrotoluol	lb.	0	1	8	to	0	1	9
Dinitrophenol	lb.	0	3	3	to	0	3	6
Dimethylaniline	lb.	0	4	6	to	0	4	9
Diphenylamine	lb.	0	4	6	to	0	4	9
H-Acid	lb.	0	13	6	to	0	14	0
Metaphenylenediamine	lb.	0	5	9	to	0	6	0
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	7	6	to	0	8	6
Monosulphonic Acid (2:7)	lb.	0	7	6	to	0	8	0
Naphthionic acid, crude	lb.	0	5	0	to	0	5	6

	per	£	s.	d.		£	s.	d.
Naphthionate of Soda	lb.	0	5	6	to	0	6	0
Naphthylamin-di-sulphonic-acid	lb.	0	5	6	to	0	6	6
Nitronaphthaline	lb.	0	1	3	to	0	1	4
Nitrotoluol	lb.	0	1	3	to	0	1	6
Orthoamidophenol, base	lb.	0	18	0	to	1	0	0
Orthodichlorbenzol	lb.	0	1	2	to	0	1	4
Orthotoluidine	lb.	0	2	6	to	0	2	9
Orthonitrotoluol	lb.	0	1	8	to	0	1	10
Para-amidophenol, base	lb.	0	15	0	to	0	16	0
Para-amidophenol, hydrochlor	lb	0	15	6	to	0	16	0
Paradichlorbenzol	lb.	0	0	6	to	0	0	8
Paranitraniline	lb.	Nominal.						
Paranitrophenol	lb.	0	2	0	to	0	2	2
Paranitrotoluol	lb.	0	5	3	to	0	5	6
Paraphenylenediamine, distilled	lb.	0	13	0	to	0	14	0
Paratoluidine	lb.	0	7	6	to	0	8	6
Phthalic anhydride	lb.	0	9	0	to	0	10	0
R. Salt, 100% basis	lb.	0	4	0	to	0	4	2
Resorcin, technical	lb.	0	11	6	to	0	12	6
Resorcin, pure	lb.	0	17	6	to	1	0	0
Salol	lb.	0	5	9	to	0	6	0
Shaeffer acid, 100% basis	lb.	0	3	6	to	0	3	0
Sulphanilic acid, crude	lb.	0	1	5	to	0	1	6
Tolidine, base	lb.	0	10	6	to	0	11	6
Tolidine, mixture	lb.	0	3	0	to	0	3	6

Miscellaneous and Paint Materials

	per	£	s.	d.		£	s.	d.
Barytes	ton	11	0	0	to	13	0	0
Casein	ton	75	0	0	to	80	0	0
Chalk, precipitated (light)	ton	20	0	0	to	24	0	0
Chalk, precipitated (heavy)	ton	10	0	0	to	12	0	0
China clay (bags extra) (f.o.r. Cornwall)	ton	1	12	6	to	3	12	6
Coke, blast furnace (S. Wales)	ton	2	12	0	to	3	0	0
Coke, foundry	ton	3	5	0	to	3	10	0
Fuller's Earth	ton	4	0	0	to	5	0	0
Lead, litharge flake	ton	67	10	0	to	69	10	0
Lead, red	cwt.	3	5	0	to	3	7	6
Lead, white	cwt.	3	15	0	to	3	17	6
Ultramarine	ton	90	0	0	to	110	0	0
Prussian Blue	cwt.	13	0	0	to	14	10	0
Chrome green	cwt.	6	5	0	to	6	10	0
Chrome yellow	cwt.	6	5	0	to	7	0	0
Mineral black	ton	10	10	0	to	12	0	0
Carbon black	lb.	0	1	3	to	0	1	6
Guignet's Green, 30%	lb.	0	1	5	to	0	1	6

Building Materials

	per	£	s.	d.		£	s.	d.
Bricks, stock	1000	4	8	0	to	4	11	0
Bricks, blue Staffs.	1000	9	10	0	to	9	11	0
Firebricks, Stourbridge	1000	10	15	0	to	10	17	6
Fireclay, Stourbridge	ton	2	2	0	to	2	4	0
Glass, sheet, 21 oz.	ft.	0	0	8½	to	0	0	8¾
Lime, ground blue Lias	ton	2	15	6	to	2	17	0
Lime, grey stone	ton	3	0	0	to	3	7	6
Linseed oil, boiled	gall.	0	11	3	to	0	11	6
Linseed oil, raw	gall.	0	10	6	to	0	11	0
Portland cement	ton	3	18	0	to	4	3	0
Slates, Bangor (First quality)	1200	40	0	0	to	41	0	0
Slates, Portmadoc (First quality)	1200	21	0	0	to	23	0	0
Tiles	1000	6	12	0	to	6	17	0
Turpentine	gall.	0	16	9	to	0	17	3
Deal, up to 3×8	standard	40	0	0	to	42	0	0
Deal, over 3×8	standard	48	0	0	to	55	0	0

The following prices are furnished by Messrs. Miles, Mole & Co., Ltd., 101, Leadenhall Street, London, E.C.

Metals and Ferro-Alloys

	per	£	s.	d.		£	s.	d.
Aluminium, 98-99%	ton	165	0	0	to	166	0	0
Antimony, English	ton	70	0	0	to	72	0	0
Copper, best selected	ton	123	15	0	to	124	10	0
Ferro Chrome, 60%	ton	57	0	0	to	58	0	0
Manganese, 76-80%	ton	30	0	0	to	35	0	0
Silicon, 45-50%	ton	30	0	0	to	35	0	0
Tungsten, 75-80%	lb.	0	3	6	to	0	4	6
Lead Ingot	ton	50	0	0	to	51	0	0
Sheets	ton	57	0	0	to	58	0	0
Nickel, 98-99%	ton	225	0	0	to	230	0	0
Tin	ton	393	0	0	to	395	0	0
Zinc Sheet	ton	90	0	0	to	95	0	0
Spelter	ton	62	0	0	to	63	0	0

Structural Steel

	per	£	s.	d.		£	s.	d.
Angles and Tees	ton	25	0	0	to	26	0	0
Flats and rounds	ton	23	0	0	to	24	0	0
Joists	ton	20	0	0	to	21	0	0
Plates	ton	24	0	0	to	25	0	0
Rails, heavy	ton	20	0	0	to	21	0	0
Sheets, 24 Gauge	ton	36	0	0	to	37	0	0
Galvd. Corrd. Sheets	ton	51	0	0	to	52	0	0

Manchester Chemical Market

SIR S. W. ROYSE & CO., LTD., of Manchester, in their monthly review of the chemical market, state:—There has been a steady demand during the month and good business has been done both for home and export. Prices generally have been fully maintained, and in many cases are higher and manufacturers are well supplied with orders. Transport continues difficult and serious delays in arrival of goods are reported. The increased railway rates came into force on the 15th inst. A large export business has been done in sulphate of copper for shipment during the next few months; the market is very firm with the rise in the metal. The home demand for green copperas continues poor, but a good trade is passing for export. There is no change in brown and grey acetate of lime, supplies being short and firmly held. Acetate of soda has been in good request and price is higher. Acetic acid is again dearer and the quantity available for near delivery is small. During January, lead has ruled firm and litharge has advanced about £5 per ton; this has affected the values of lead salts and stimulated the demand for acetates and nitrate of lead. Carbonate of potash is in steady request at unchanged prices. Montreal potashes have been in better demand, but arrivals are disappointing. Supplies of white powdered arsenic from abroad have not affected prices, and British makers have sold freely at full figures for delivery well ahead. Yellow prussiates of potash and soda are still in short supply and good arrivals from the Continent have rapidly gone into consumption. Tartaric acid is firm and in good request for both home and export. Cream of tartar is dearer and supplies on spot are small. Citric acid fully maintains its strong position. There has been an active demand for bichromates and resale parcels have been cleared. Oxalic acid has advanced strongly and makers are sold out somewhat ahead. Prices for borax and boracic acid have been advanced £2 per ton. Phosphate of soda has been steadily called for. Supplies of alum and sulphate of alumina are difficult to obtain. Business in lump salammoniac has been limited, makers being well booked up. Muriate of ammonia has been moving off well for shipment. Caustic soda and ammonia alkali have been in good request, and bleaching powder well inquired for. Tar products generally are more active and higher prices are ruling. Pitch continues firm with increased continental demand, and the tendency is towards higher values. The production of benzoles hardly keeps pace with requirements for motor purposes. Toluoles remain steady. Solvent naphthas have again advanced and are in good request. Creosote is in demand and supplies are readily taken up at increased values. Crude carbolic acid is in good inquiry and the higher prices are stimulating production. Crystal carbolic acid is in short supply and is firm. Naphthalenes are in better request and prices higher. In sulphate of ammonia the home market remains firm, but the export demand is small.

The Marking of Goods

THE Merchandise Marks Committee announce that associations and others who may wish to make representations on any of the matters which the Committee are investigating should communicate with the secretary of the Committee at the Patent Office, 25, Southampton Buildings, W.C.2, not later than February 14. The Committee, who were appointed by the Board of Trade, and sit under the chairmanship of Mr. Harry Greer, M.P., are dealing in particular with the following questions: (1) Whether all imported goods, or particular classes of imported goods, should be required to bear on importation, or on sale in this country, a statement as to their origin; whether the statement should specify the actual country of origin, or should merely indicate that the goods are not of British or not of United Kingdom origin; and whether any such requirement should extend to goods transhipped in this country, or re-exported from this country, to British Possessions and foreign countries; (2) The advisability of encouraging the institution of an Empire Mark to denote British origin; the utility and effect of national trade marks and other similar collective marks; and whether any such mark or marks, if used at all, should be administered by the Government, or by municipalities, or by associations of traders; (3) Whether any and what international action is necessary or desirable to prevent the false marking of goods with indications of British origin, and to protect regional appellations of origin.

Company News

BRITISH OIL & CAKE MILLS.—The directors have decided to pay on March 8 a further dividend of 15 per cent., less tax, on the ordinary share capital, exclusive of the issue of November last. This must be regarded as the final dividend for the year 1919.

KILLIFRETH MINE.—At a general meeting held on February 6 a resolution was carried that the capital of the company be increased to £125,000 by the creation of 25,000 shares of £1 each. Present shareholders are offered shares at 16s. each.

PILBARA COPPER FIELDS.—A circular issued to the shareholders states that the company has acquired from the liquidator and receiver of the Whim Well Copper Mines the whole of their copper mines, machinery, plant, equipment, &c., including ore at dump, with assets totalling £271,737.

MONS CUPRI (WHIM WELL).—At an extraordinary general meeting held on February 6 it was resolved to provide further working capital by the creation of 120,000 preferred ordinary shares of 5s. each. This increase is required in order to develop the scheme for the leaching of the copper ores at Whim Creek.

PETROLEUM OPTIONS.—Resolutions have been passed to increase the capital to £55,000 by the creation of 500,000 additional ordinary shares of 1s. each. These are offered in the first instance at a premium of 1s. per share to the members of the company in proportion to the amount of capital at present held by them.

LEVER BROS. & NIGER CO.—A circular issued by the latter company states that the offer of Lever Brothers to purchase the ordinary shares of the company has been accepted by the holders of upwards of 75 per cent. of the issued shares. The agreement has therefore become definite (*see* THE CHEMICAL AGE, January 31, p. 134).

GUEST, KEEN & NETTLEFOLDS.—The directors have declared interim dividends on the first and second preference shares of 5 per cent. per annum, free of tax, and 10 per cent. per annum, free of tax, on the ordinary shares for the six months to December 31, 1919.

SCOTTISH AMERICAN OIL & TRANSPORT CO.—At an extraordinary general meeting held on February 5, it was decided to increase the capital of the company to £10,000,000, by the issue of 5,000,000 new shares of £1 each. Mr. Thomas J. Callaghan (chairman of the company), in speaking of the urgent need for the provision of oil tankers, said that the directors were arranging for the flotation of Tankers, Ltd., and it was hoped that in a few days there would be offered 1,500,000 8 per cent. cumulative participating convertible preference shares of £1 each in the new company. Arrangements had been made with Messrs. Vickers, Ltd., and Messrs. Armstrong, Whitworth & Co., Ltd., with regard to the construction of the tank steamers. It is intended to give to subscribers to Tankers, Ltd., rights to convert on satisfactory terms into Scottish American.

JEMAA EXPLORATION CO.—A circular issued to the shareholders states that at the recent general and extraordinary general meetings of the company it was decided that the £1 shares of the company should be divided into four shares of 5s. each. The capital of the company has been increased to £65,000 by the creation of 160,000 new shares of 5s. each, ranking for dividend and in all other respects pari passu with the original shares. Fifty thousand of the new shares are offered to the shareholders upon the register on the 28th ult. at par, being at the rate of two new shares for every four now held.

VULCANITE, LTD.—The accounts for the year to October 31 last show a net profit of £15,648, including £2,325 brought in. The directors recommend a dividend of 10 per cent., less tax, for the year and a bonus of 2½ per cent., free of tax, the same as for each of the three preceding years, transferring £1,901 to depreciation reserve, and carrying forward £6,593. It is proposed to increase the capital to £150,000, by the creation of 50,000 new ordinary shares of £1 each.

SAPON SOAPS.—The directors are issuing 500,000 new Ordinary shares of 4s. each at par. The shares are offered to existing shareholders in the proportion of five new shares for every two Preference, and one new Ordinary for every two Ordinary shares held.

VAN DEN BURGHS.—At an extraordinary general meeting on Tuesday the resolutions previously passed altering and increasing the capital (*see* THE CHEMICAL AGE, January 31, p. 133) were unanimously confirmed, and a further resolution was passed authorising the directors to capitalise part of the undistributed profits.

The British Science Guild Journal

THE *Journal* of the British Science Guild for January, 1920 (6d., pp. 49), contains many features of interest to industrial chemists. Among these is the correspondence between the Guild and the Foreign Office with regard to the suggestion of the appointment of Scientific Attachés to British embassies and legations, which the Government considered to be impracticable. A communication from Mr. W. H. Twelvetrees, late Government Geologist in Tasmania, is also included, dealing with the extensive mineral deposits in Tasmania, and the industries there. Other features include the German view of the Guild's activities in connection with the founding of a British optical industry, an address on Science in Industry by Sir Richard Gregory, and a report in petrological, chemical and metallurgical microscopes.

Stocks and Shares

Commercial, Industrial, &c.

	Quotations Feb. 4.	Quotations Feb. 11.
Alby United Carbide Factories, Ord....	1/16–1/16	2/32–2/32
Associated Portland Cement Manufrs. (1900) Ltd., Ord.	31/9–32/9	32/3–33/3
Bell's United Asbestos Co., Ltd., Ord.	1 7/8–2 1/8	1 7/8–2 1/8
Bleachers' Association, Ltd., Ord.	2 7/16–2 9/16	2 21/32–2 23/32
Borax Consolidated, Ltd., Prefd. Ord.	4–4 1/2	4–4 1/2
Bradford Dyers' Assoc. Ltd., Ord.	3 3/8–3 1/2	3 5/16–3 7/16
British Aluminium Co., Ltd., Ord.	1 31/32–1 33/32	1 29/32–1 31/32
British Oil and Cake Mills, Ltd., Ord ...	2 5/16–2 5/16	2 5/16–2 5/16
British Portland Cement Manufrs., Ltd., Ord.	35/6–37/6	35/0–37/0
Brunner, Mond & Co., Ltd., Ord.	2 1/16–2 3/16	2 1/16–2 3/16
Castner-Kellner Alkali Co., Ltd.	3 7/8–4 1/8	3 7/8–4 1/8
China Clay Corporation, Ltd., Ord.	1/4–3/8	1/4–3/8
Cook (Edward) & Co., Ltd., 4% 1st Mort. Deb. Stock Red.	57–61	57–61
Courtaulds, Ltd.	9 1/4–9 3/4	9 1/4–9 3/4
Crosfield (Joseph) & Sons, Ltd., Cum. 6% Prefce	27/32–31/32	27/32–31/32
Curtis's & Harvey, Ltd. 4¼% 1st. Mort. Deb. Stk. Red.	69–71	69–71
Electro Bleach & By-Products Ltd., Ord.	18/4 1/2–18/7 1/2	18/7 1/2–18/9
Explosives Trades, Ltd., Ord	23/6–24/6	23/0–24/0
Field (J. C. & J.), Ltd., Ord	1 7/16–1 11/16	1 7/8–2 1/8
Greenwich Inlaid Linoleum (Fredk. Walton's New Patents) Co., Ltd., Ord.	3/4–7/8	11/16–13/16
Harrisons & Crosfield, Ltd., Prefd. Ord.	1 1/4–1 3/8	1 1/4–1 3/8
India Rubber, Gutta Percha & Tel. Wks. Co., Ltd., Ord	15–16	15–16
Lawes' Chemical Manure Co., Ltd., Ord.	4 3/4–5 3/4	4 3/4–5 3/4
Lever Bros., Ltd., 6% Cum. "A" Pref.	17/9–18/6	17/9–18/6
Do. 6½% Cum. " B " Prefce	19/0–19/9	19/0–19/9
Magadi Soda Co., Ltd., Ord	20/3–21/3	20/0–21/0
Manganese Bronze & Brass Co., Ltd., Ord.	5/8–3/4	5/8–3/4
Maypole Dairy Co., Ltd., Defd. Ord. ...	1 1/16–1 1/8	1 3/32–1 5/32
Mond Nickel Co., Ltd., 7% Cum. Pref.	1 1/16–1 3/16	1 1/16–1 3/16
Do. 7% Non. Cum. Pref.	7/8–1	7/8–1
Pacific Phosphate Co., Ltd., Ord.	4 3/8–4 7/8	4 7/16–4 11/16
Power-Gas Corporation, Ltd., Ord	5/8–3/4	5/8–3/4
Price's Patent Candle Co., Ltd., 5% Deb. Stk. Red.	83–93	83–93
Salt Union, Ltd., Ord.	1 13/32–1 23/32	1 15/32–1 23/32
United Alkali Co., Ltd., Ord.	1 9/16–1 13/16	1 9/16–1 13/16
Val de Travers Asphalte Paving Co., Ltd.	3/4–1	3/4–1
Van den Berghs, Ltd., Ord.	3 5/8–3 7/8 xd	3 9/16–3 11/16 xd
Walkers, Parker & Co., Ltd.	1 5/16–1 7/16	1 3/8–1 1/2
Welsbach Light Co., Ltd.	2 5/8–2 7/8	2 1/2–2 3/4
Gas, Iron, Coal and Steel		
Armstrong (Sir W. G.) Whitworth, Ltd., Ord.	36/0–37/0	1 3/4–1 13/16
Ebbw Vale Steel, Iron & Coal Co., Ltd., Ord.	1 1/32–1 1/32	1 1/32–1 1/32
Gas Light & Coke Co., Ordinary Stock (4% Stand.)	54–57	54–57
Hadfield's, Ltd., Ordinary	44/0–46/0	2 3/16–2 1/4
South Metropolitan Gas Co., Ordinary (4% Stand.)	55–58	55–58
Staveley Coal & Iron Co., Ltd., Ord.	1 13/16–1 15/16 xd	1 13/16–1 15/16 xd
Vickers, Ltd., Ordinary	35/6–36/6	34/0–35/0
Mines, Nitrate, &c.		
Anglo-Chilian Nitrate and Rly. Co., Ltd., Ord.	19–20	18 1/2–19 1/2
Antofagasta Nitrate Co. Compañia de Salitres de Antofagasta) 5½% 1st. Mt. Debs. Red.	85–90	85–90
Lagunas Nitrate Co., Ltd.	1 7/8–2 1/8	1 7/8–2 1/8
Rio Tinto Co., Ltd., Ord. (Bearer)	45–47	47–49
Tarapaca & Tocopilla Nitrate Co., Ltd.	24/0–26/0	23/0–25/0
Oil and Rubber		
Anglo-Java Rubber & Produce Co., Ltd.	7/9–8/3	7/6–8/0
Anglo-Maikop Corporation, Ltd., Ord.	15/16–1	15/16–1
Anglo-Malay Rubber Co., Ltd.	14/0–14/6	14/3–15/3
Anglo-Persian Oil Co., Ltd., Cum. 6% Part	1 3/16–1 1/4	1 3/16–1 1/4
Burmah Oil Co., Ltd., Ord.	21 5/16–21 9/16	20 7/8–21 1/8
Chersonese (F.M.S.) Estates, Ltd.	4/3–4/6	4/3–4/6
Linggi Plantations, Ltd., Ord.	3 5/16–3 7/16	3 1/4–3 3/8
Mexican Eagle Oil Co., Ltd. (Cia. Mexicana de Pet. " El Aguila " S.A.) Ordinary (Bearer)	11 7/16–11 11/16	10 3/4–11
" Shell " Transport & Trading Co., Ltd., Ord.	13 1/16–13 5/16	12 5/8–12 7/8
Do. 5% Cum. Pref.	8 1/4–8 1/2	8 1/4–8 1/2

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

London Gazette

Partnership Dissolved

PIMLOTT, WILLIAM, and HOWARD, TOM, chemical and dye manufacturers, Cutler Hill Works, Failsworth, near Manchester, under the style or firm of Cutler Hill Colour & Chemical Co., by mutual consent as and from December 31, 1919. All debts received and paid by Tom Howard on his own account, under the old style or firm name.

Companies Winding Up Voluntarily

ANGLO-AMERICAN PATENT BOTTLE CO., LTD.—A meeting of creditors will be held at the offices of Messrs. Baker, Sutton & Co., C.A., Eldon Street House, Eldon Street, London, E.C. 2, on Friday, February 20, at 12 noon. John Baker, Liquidator.

COLNBROOK MANUFACTURING CO., LTD.—A meeting of creditors will be held at the offices of E. Woodroffe, C.A., 9 & 10, Pancras Lane, Queen Street, London, E.C. 4, at 12 noon, on Tuesday, February 24. Creditors' claims on or before the above mentioned date. Edmund Woodroffe, Liquidator.

MAIKOP DEEP DRILLING CO., LTD.—Liquidator, Mr. Jersey Barnes, secretary of the company.

Notice of Intended Dividend

NEW ZEALAND OILFIELDS, LTD, 14-16, Cockspur Street, London. March 1. H. E. Burgess, Official Receiver and Liquidator, 33, Carey Street, Lincoln's Inn, London, W.C.

Liquidator's Notice

THE ASBESTOS & RUBBER CO. (MIDDLESBRO'), LTD.—A general meeting of members will be held at Suffolk House, Cannon Street, London, E.C.4, on March 9, at three p.m.

Order Made on Application for Discharge

HANLEY, JAMES ALEC, 5, Woodside Terrace, Leeds, agricultural chemist. Bankrupt discharged subject to the ollowing condition to be fulfilled before his discharge takes effect, namely: He shall, before the signing of this Order, consent to judgment being entered against him in the County Court of Yorkshire, holden at Leeds, by the Official Receiver for the sum of £100, being part of the balance of the debts provable in the bankruptcy which is not satisfied at the date of this Order, and £1. 10s. for costs of judgment. Further ordered, without prejudice and subject to any execution which may be issued on the said judgment with the leave of the Court, that the said sum of £100 be paid out of the future earnings or after-acquired property of the bankrupt in manner following, that is to say, the bankrupt shall pay the said sum of £100 within one calendar month from the date hereof to the Official Receiver for distribution among the creditors in the bankruptcy. Further ordered, that upon the required consent being given, judgment may be entered against the bankrupt in the County Court of Yorkshire holden at Leeds, for the said sum of £100, together with £1. 10s. for costs of judgment. Note.—The sum of £100 was paid to the Official Receiver on January 15, 1920, in lieu of signing judgment.—Date of order, January 12, 1920.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act, of* 1908, *provides that every Mortgage or Charge, as described therein, created after July* 1, 1908, *shall be registered within* 21 *days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges which would, if created after July* 1, 1908, *require registration. The following Mortgages and Charges have been so registered. In each case the total debt, as specified, in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced since such date.*]

HILGER (ADAM), LTD., LONDON, N.W.—Reg. January 28. £16,000 debentures; general charge. *£15,000. March 15, 1919.

HOWARDS & SONS, LTD., ILFORD.—Registered January 29. Trust deed dated January 16, 1920, securing £50,000 debenture stock; charged on hereditaments at Stratford, West Ham, Ilford and Barking, also general charge.

WRIGGLESWORTH (E. H.), LTD. (formerly EXTIRMO, LTD.), HULL.—Registered January 29. £3,000 debentures, subject to mortgage registered December 24, 1919; general charge. *Nil. March 6, 1919.

We have received from T. H. Harris & Sons, Ltd., soapmakers, London, who specialise in textile and laundry soaps, an attractively illustrated wall calendar for 1920.

New Companies Registered

The following list has been prepared for us by Jordan & Sons, Ltd., company registration agents, 116, and 117, Chancery Lane, London, W.C.:—

BUTE PATENT FUEL CO., LTD., East Tyndall Street, East Moors, Cardiff.—Manufacturers of fuel, patent fuel and briquettes. Nominal Capital, £20,000 in 20,000 shares of £1 each. Directors: J. W. V. Jones, "Wooda," Radyr, Glam.; H. M. Davies, 7, Waterloo Gardens, Cardiff; Catherine R. Jones, 104, Newport Road, Cardiff; J. H. Davis, 38, Plymouth Road, Penarth, Glam. Qualification of Directors, £1,000. Remuneration of Directors, £100 each.

CHESTERFIELD CONCRETE MANUFACTURING CO., LTD.—Manufacturers and wholesale and retail dealers in concrete, cement, lime, stone and bricks. Nominal Capital, £5,000 in 5,000 shares of £1 each. Directors: E. Revill, Baythorpe Road, Chesterfield; O. B. Short, Manor Farm, Stonegravels, Chesterfield; C. Black, Walton Fields Farm, Brampton, Chesterfield; and three others. Qualification of Directors, £100.

CYANIDE TRUST, LTD., 5, Victoria Street, Westminster, S.W.—To acquire interests in patents in relation to the manufacture of cyanide, ammonia, ammonium sulphate, &c. Nominal Capital, £2,500 in 100,000 Founders' shares of 6d. each. Minimum subscription, 7 shares. Directors: F. J. Commin, 104, Upper Tulse Hill, S.W.; C. H. H. Scott, 9, Harrington Street, Liverpool. Qualification of Directors, 100 shares. Remuneration of Directors, £250.

DICKSON (F. C.) & CO., LTD.—To acquire the Blackbeck Gunpowder Works and carry on the business of manufacturers of explosives. Nominal Capital, £50,000 in 50,000 shares of £1 each. Directors to be appointed by subscribers. Qualification of Directors, £25. Remuneration of Directors, to be voted by Company in General Meeting. Subscribers: R. G. Reeve, Bank Buildings, St. James Street, S.W.; J. H. Todd, Bank Buildings, St. James Street, S.W.

DODSLEYS, LTD., 6A, Hargreaves Street, Burnley.—Pharmacy and drug store proprietors. Nominal Capital, £1,000 in 1,000 shares of £1 each. Directors: C. Wilbons, 43, Reynolds Street, Burnley; C. Ingham, 18, Haven Street, Burnley. Qualification of Directors, 1 share.

DULAC, LTD.—Chemists, druggists, drysalters, oil and colourmen. Nominal Capital, £50,000 in 2,500 Preference shares of £10 each, and 24,500 Preference "A" shares of £1 each, and 10,000 Deferred shares of 1s. each. Directors: B. W. Arnold; H. Hesford, 10, Langdale Road, Hove (Man. Dir.); P. Villian, 14, Effra Road, Brixton, S.W. Qualification of Directors, 1 share. Remuneration of Directors, £100 each.

EVERITT & CO., LTD., 40, Chapel Street, Liverpool.—Metal, mineral, alloys, chemical and general merchants. Nominal Capital, £100,000 in 25,000 £10 per cent. Cumulative Preference shares, and 75,000 Ordinary shares of £1 each. Directors: R. Everitt (Chairman); F. W. Dingwell; G. E. Lewis. Qualification of Directors, £250.

LEWINGTONS, LTD., Kelvin Works, Bromford Lane, West Bromwich.—Manufacturers and dealers in chemical products. Nominal Capital, £1,000 in 1,000 shares of £1 each. Directors: P. L. Whitehouse, 16, Lombard Street, West Bromwich (Per. Dir.) Qualification of Directors, 1 share.

MOORHOUSE (JAMES) & CO., LTD., 62, Scorland Road, Nelson.—Wholesale and retail drysalters. Nominal capital, £5,000 in 2,000 Preference shares and 3,000 Ordinary shares of £1 each. Director: J. Moorhouse. Qualification of Directors, 300 shares.

PEARCE (A. C.) & CO., (LONDON) LTD., Norfolk House, 7, Laurence Pountney Hill, E.C.—Importers and exporters of chemicals and produce. Nominal Capital, £2,000 in 2,000 shares of £1 each. Directors: A. C. Pearce, 14, Boston Road, East Ham, E.; J. G. Baretto, 64, Clarence Gate Gardens, Baker Street, W. Qualification of Directors, £5.

PHOSVIS, LTD., 39, Victoria Street, S.W.—Manufacturers of vegetable phosphorus. Nominal Capital, £2,000 in 2,000 shares of £1 each. Directors: J. G. Huskinson, 28, Strutton Ground, S.W.1; J. W. Stafford, 9, Stanley Place, S.W.1. Qualification of Directors, £50. Remuneration of Directors, 15 per cent. of net profits.

REXEAN CO., LTD., 141, Lord Street, Southport.—Blenders of essential oils and manufacturers of perfumes and toilet preparations. Nominal Capital, £2,000 in 2,000 shares of £1 each. Directors: H. R. Healey, 38, Aughton Road, Birkdale, Southport; Anges M. Healey, 38, Aughton Road, Birkdale, Southport. Qualification of Directors, £20.

TUBBS & CO., LTD., 24, Great Tower Street, E.C.—To manufacture chemical, optical, photographic materials and instruments, &c. Nominal Capital, £5,000 in 4,950 Participating Preference shares of £1 each, and 1,000 Ordinary shares of 1s. each. Directors: H. S. Tubbs (Man. Dir.); J. Whaley. Remuneration of Directors, £20 each.

TARIFF.

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WANTED.—LEAD, remelted in pigs or ingots. Also Lead Ashes, Slags and Skimmings. Prompt cash terms.—SPOONER, SON & CO., 214, Bishopsgate, London, E.C.2. Telephone: London Wall 5959. Telegrams: "Spooneral, London."

CAMERON DOUBLE PUMP FOR SALE, 6 in. steam, 4 in. water, 6 in. stroke, in new condition, been rebuilt at makers, costing £55, recently; No. 3 Hindley Wall Pattern Donkey Pump, 4 in. steam, 2 in. water: Beaumont rebuilt 3 in. Centrifugal Pump.—J. BOOTH & SON, Congleton, Ches. Telegrams: "Booth, Millwright Congleton." 'Phone No. 114.

TWENTY-SIX 4 in. Bore Fullway Disc Type WEDGE VALVES, at present 6 ft. 6 in. overall, can be shortened and converted into ordinary valve 2 ft. 6 in. high. Bargain, £7 each. Box No. 54, CHEMICAL AGE, Offices, 8, Bouverie Street, E.C.4.

CREOSOTE SALTS WANTED in good quantities anywhere. Samples and prices to FIRELIGHT SUPPLIES, Gorton, Manchester.

FOR SALE.—About 150 tons BLAST FURNACE PITCH, now in trucks at Goole Docks. Offers wanted. Principals only.—Apply, TOM SHERBURN, Agent, Bank Chambers, Goole.

DISINTEGRATORS FOR SALE.—Size No. 1½, by Carters & Christy; also a No. 00 Carters, and a 2½ Christy's, all as new. CAKE BREAKING MILL, by Nicholsons, of Newark, with two pairs of rolls, and 16 in. mouth, could be used for reducing lumpy friable Chemicals. BONE CRUSHER, size HH, with Rotary-Screen, by Nicholson. Pair of 30 in., also 42 in., and 48 in. flat running Millstones on wood and iron self-contained-frames. Blackstone Mills, fitted with 14 in. Adamas, and 30 in. French Burr Stones. Several pairs of French Burr Millstones, only from 44/54 in. diameter, new thickness. Two heavy Crushing Mills, fitted with chilled rolls, 30 in. by 16 in., placed vertically in frames. One double horizontal chilled iron Roller Mill, 24 in. by 9 in. diameter, by Hopkinson. One Crushing Mill with 17 in. × 12 in. rolls. Centrifugal-Flour-Dressing-Machines 2 and 2½ sheets long, 20 in., 27 in. and 30 in. diameter complete. Several worm-conveyors with and without boxes. Steam Winch with double engines, to lift about 1 ton. New belt-driven-friction-Hoists, to lift 10 cwts. Several Parrafin Oil Engines, from 6 to 25 H.P. Several Gas Engines, from 6 to 18 H.P. Trailer or Heavy Horse Lorry on steel tyres, 4½ in. wide, to carry up to 4 tons as new. Clayton Rubber-tyred Modern 3-ton Steam Lorry. 4-ton Modern Peerless Petrol Lorry, with new platform and cab fitted. Equal to new. 2-ton Halley Petrol Lorry.—For fuller particulars and prices, write to J. BOOTH & SON, General Engineers, Congleton, Cheshire.

FOR SALE, one New "Kennedy" Patent Bending Machine, screwed mandril, 5½ in. diameter, and six rings, i.e. three rings, one each 8 in., 12 in., and 16 in., grooved to suit tubing 1¼ in., 1½ in., 1⅞ in. outside diameter; three rings, one each 8 in., 12 in. and 16 in., to suit tubing 1½ in., 1⅞ in., and 2 in. outside diameter.—What offers? to GODWARD CARBARETTER CO. (London), Ltd., Kingston-on-Thames.

AGENTS WANTED.

WHERE not already represented, on commission and expenses, to Sell our Cycle and Motor Oils, Carbide, General Lubricating Oils and Greases. Real live men, of good character, prepared to work, can earn a good living, and those making good after three months we shall take on to our permanent staff.—Apply, RUSSELL OIL AND CHEMICAL CO., LTD., Stratford Market, E.15, and Adams Street, Birmingham.

FOR SALE, Horizontal Steam Engine, by Marshall, 20 B.H.P., perfect order; also Vertical Feed Water Superheater and Horizontal Boiler for the same; Worthington Pump attached; £250 the lot.—Apply BURSAR, Douai Abbey—near Reading.

FOR SALE, New 10-ton Lifting Blocks, by Herbert Morris, Ltd—THE MIDDLESEX CHEMICAL CO. (1917), LTD., 304, West Ferry Road, Millwall, London, E.14.

FOUR Back-geared Capstan Lathes, by "Pollock and MacNab," 7½ in. centres by 6-6 in. bed, with hexagon turret, power feed with automatic stops, cross traverse to turret by hand, countershaft with two sets pulleys for 4-speed drive or reverse, 3-speed cone for 4-in. belt, pump, water trough, ring steady and gear guard.—T. H. & J. DANIELS, LTD., Lightpill Ironworks, Stroud, Glos.

Notices

PATENTS, INVENTIONS or TRADE MARKS. Advice and handbook free.—Write B. T. KING, Regd. Patent Agent, 165, Queen Victoria Street, E.C.4; or 'Phone Central 268.

G. R.

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By Sykes. Lot No. 78, 2 cylinders on channelled irons and sleepers. Vertical Boiler, 10 ft. by 4 ft., with four-wheeled trolley 5,000 ft. 6 m.m. coil steel rope. Lying at The Kite Balloon School, Lydd. Ref. G.1986. M.K. No. 22023.

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Grinding Mills and Runners, Mortar and Pestle of Wedgewood, as No. 5 on their Catalogues. Lying at Royal Gunpowder Factory (Lower Store), Waltham Abbey. Ref. G. 1676, M.K. 17628/32.

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Petrol-driven by Clayton & Co. Type M. Complete with two lengths of Armoured Hose, each 15 ft. long, with couplings. The gas from this machine is effective within 20 minutes. Lying at The Barracks, Oswestry, S.D. Ref. G. 1977, M.K. No. 21908.

SILICOL PLANT AND TANK.

Admiralty Type B. for the production of Hydrogen Gas. Constructed by Messrs. S. Cutler & Sons, to produce 10,000 cubic ft. per hour. Overall dimensions 20 ft. by 11 ft. by 20 ft. Comprising soda tank and tray, Generating Chamber, Water Storage Tank, Scrubber and separator, 1½ H.P. Motor for driving the stirring gear, complete with starter, piping, valves, staying, &c. Overall dimensions of tank staying, &c., built of 9 in. by 4 in. timber. Lying at The Balloon Station, Sheerness, Kent. Ref. G. 1332, M.K. 21497.

Fuller particulars of the above, together with Tender Forms, and permits to view can be obtained on application to the CONTROLLER, D.B.I.E., Charing Cross Embankment Buildings, W.C.2.

NOTE.—For particulars of other Government Property for Sale, see "SURPLUS," price 3d. at all bookstalls, or by quarterly subscription of 2s. post free, payable in advance to the Director of Publicity, Ministry of Munitions, Whitehall Place, London, S.W.1.

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